# HOW TO DO IT

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"KINKS"
from
The Magazine-
Concrete

# How To Do It

## A Book of "Kinks" from the magazine CONCRETE

Compiled by

HARVEY WHIPPLE

MANAGING EDITOR

CONCRETE

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## FOREWORD

The contents of this book, with few exceptions, were written by readers of CONCRETE. It is purely a compilation from the pages of that magazine. It is not in any sense a general reference work on concrete, but presents merely the unrelated solutions of little and big problems met with in the concrete field. Not everything in the book represents best practice —but the actual means employed chiefly in special cases. The one hundred and fifty odd kinks are presented because one man's experience frequently fits in and supplies the solution of another man's problem. The source of the information is given, when possible, in each case with a reference to the issue of CONCRETE in which it was published.

The Editors of CONCRETE make a standing offer to give a copy of this kink book, or of another volume of kinks which it is hoped soon to issue, to anyone contributing a kink suitable for publication in the pages of CONCRETE.

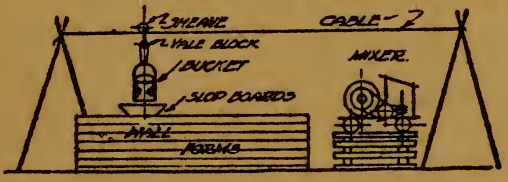
—H. W.,

CONCRETE, April, 1919.

# Mixing and Placing Concrete

## Saves Five Men in Placing Concrete

Here is something I used with great success while putting up two buildings for the Kissel Motor Kar Co. The buildings were 40′ x 130′ and 56′ x 140′, with 13″ walls 6′ high. It took 6 men wheeling concrete up a scaffold to keep the mixer busy, and the




CABLE RIG TO HANDLE CONCRETE BUCKET

scaffold had to be so wide that they could pass one another. I now have a plan by which one man can do the work of the six. I set an A frame on each end of the wall and stretched a ½″ cable over this, with sheave and yale block and bucket large enough to take the full batch from the mixer. The handle on the bucket was a little above the center, so as to make it balance. The man filled his bucket from the mixer, raised it about 1½′ to clear the top of the wall, and pushed it over the wall and dumped it into the forms. The forms had side boards 3′ long and 1′ high, which were moved about and which prevented slopping of the concrete.

The mixer was set on blocking, so the bucket would not have to be raised very high after filling with concrete to clear the wall.—Arthur W. Schauer, Hartford, Wis. [*May, 1918, p. 154.*]

## A Simple "Hydraulic" Hoist

A simple elevator was put into operation in the erection of a reinforced concrete building in Keene, N. H. It consisted of a light wooden frame erected on the roof and overhanging the edge. To the frame two well-wheels were attached 10′ above the roof. Over these wheels ran a rope and to each end of the rope was attached a wooden bucket. The rope was of such a length that when one bucket was on the ground the other would be about 3′ above the roof. Each bucket had a capacity of 2½ cu. ft. and one was used for materials and the other for water. The material bucket was slightly heavier than the water bucket, so that when the hoist was at rest the material bucket would be on the ground. The well-wheels were placed 12′ apart, so that there would be no interference between the buckets as they passed up and down.

The water bucket was filled from a 50-gal. barrel. Into this barrel water flowed continuously through a ¾″ pipe at 50 lbs. pressure. The barrel was placed in a horizontal position, near the edge and 3′ above the roof, with its long axis parallel with the edge of the roof. A shaft was passed through the heads, slightly off center, and a frame was erected to carry the shaft and allow it to revolve freely. In one side of the barrel near the top a circular opening was cut and a sheet metal spout attached in such a position that when the barrel was slightly revolved the spout would discharge water into the water bucket. An arm was attached to the head of the barrel at right angles to the horizontal axis and a man was stationed beside the barrel to fill the water bucket at the proper time. The hoisting operation consisted in filling the bucket on the ground with the material to be raised, then revolving the water barrel, allowing the water to

flow into the water bucket. The water bucket would then descend and the material bucket rise. When the material arrived at the right height it would be stopped by the water bucket reaching the ground and the material would be dumped into wheelbarrows and the water into the sewer.

This hoist was used for raising slag for roofing. The distance from ground to roof was 28′. Two men were required to operate the hoist and the average load carried each trip was 2½ cu. ft. The maximum speed attained was two trips per min. An average speed of 65 trips per hour was maintained. The men tending hoist received 25 cents and 28 cents per hour. From this it is seen that the labor cost of raising the slag was 12 cents per ton (calling the weight of slag 55 lbs. per cu. ft.). The frame to which the well-wheels were attached was erected at a cost of $1.80 and 210′, B. M., of lumber was required for this purpose. Besides this there was a slight expense for water and the initial cost of $2.10 for making and installing the hardware on buckets and water barrel.

On this work the material was shoveled from the car into wheelbarrows, dumped from wheelbarrow into bucket then dumped from bucket into wheelbarrow again and wheeled to place near where it was to be used.

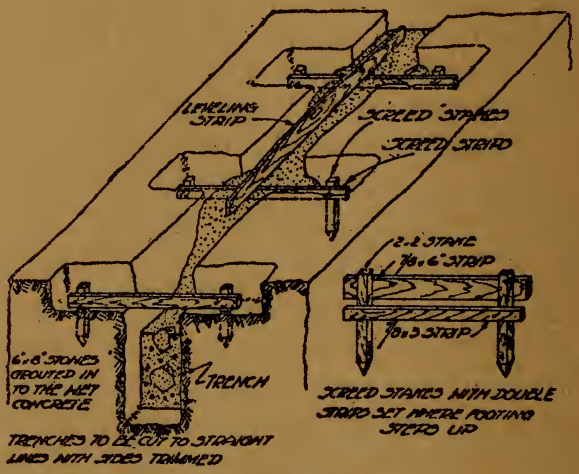
On small jobs where the initial cost of installing an elevator is prohibitive, this method of hoisting may be profitably employed.—A. P. Rounds, Contractor, Stoneham, Mass. [*Feb., 1917, p. 49.*]

## Butter Paddle for Rough Casting Stucco

We have learned that in throwing rough cast and pebble dash stucco, nothing in the paddle line equals an old butter paddle with a crooked handle. It seems that the shape of the thing holds the mud like a man's hand.—W. C. McCreight, Oklahoma City, Okla. [*June, 1918, p. 206.*]

## Leveling Trench Foundations

In the construction of concrete houses without cellars at Claymont, Del., for the General Chemical Co., in which the Morrill system of steel forms was used, the foundation trenches 3′ 6″ deep and 16″ wide were cut in the clay (see sketch). As soon as the trenches



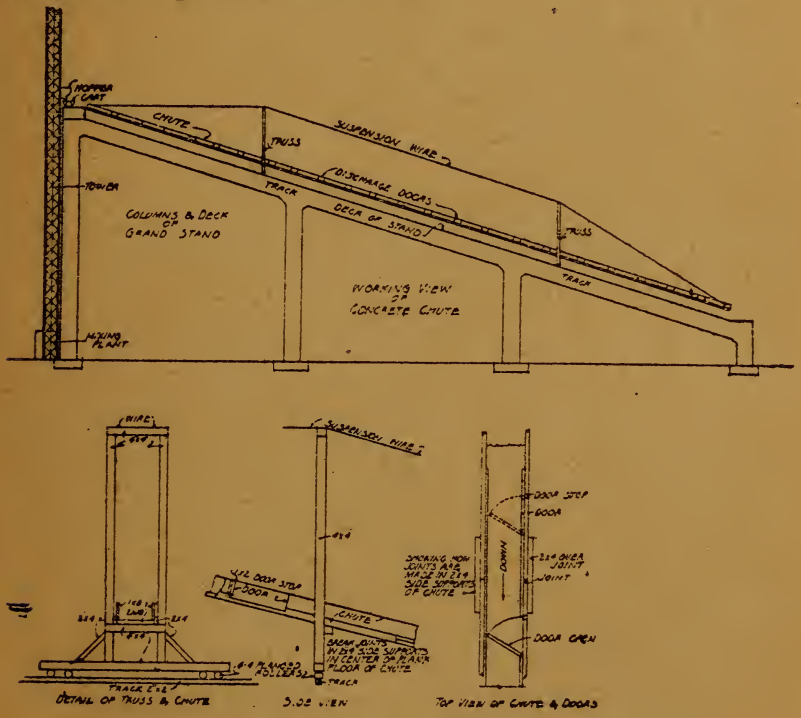

DETAIL OF TRENCH FOOTING

SHOWING EXCAVATION & SCREEDS SET TO LEVEL UP CONCRETE FOOTINGS. SCREEDS TO BE SET 8 FT. & TOP OF TRENCH FOOTINGS TO BE AT LEAST 4 IN. BELOW LINE OF FINISHED GRADE AT ALL POINTS

were completed screed boards were set 8′ apart across the trench. The trenches were then filled with concrete, the top was worked off level with a straight edge resting on the screed boards. The foundation was then complete, ready to receive the first course of the steel forms for the first story walls. In a portion of the foundation, stones weighing from 10 to 20 lbs. were grouted into the concrete as the trenches were filled. The mixer was set up beside the trenches, so that the concrete was spouted direct. The mixer was moved along as the work progressed. [*Jan., 1919, p. 17.*]

## Methods in Concreting a Grand Stand

W. S. Jonason, Aberdeen, S. D., built a reinforced concrete grand stand for the South Dakota State Fair Assn., Huron, S. D., to replace the old frame structure and it has a seating capacity of 5,500 people. Design is by Homer M. Derr, state engineer, at Pierre, S. D., and work was done under the supervision of A. Bjordstrup, Mitchell, S. D.




DETAILS OF 80′ CHUTE FOR PLACING CONCRETE

The grand stand is constructed throughout with reinforced concrete, with a concrete roof supported by a steel structure. It is 300′ long and 50′ high at the back.

All beams, columns and deck were cast together. The beams and columns are spaced 16′ apart, and in such manner that additional units or sections may be added from time to time. Expansion joints are made

from front to back of the stand, and each section is entirely free from the other. The slipping due to expansion over the columns on the joints is overcome by the use of rollers set in the joints.

The concrete was deposited on Hy Rib reinforcing, acting both as forms and reinforcing. After the stand was completed the under side was plastered with a cement mortar and washed with a white cement.

A special device was used by the contractor for distributing the concrete in the forms along the deck of the grand stand. Concrete was mixed at a central plant and elevated at the back and center of the stand. On the top a runway was made for carts to carry the concrete from the tower to the portable chute. This chute was made of inch boards, and ran from the top to the front of the stand, making a continuous trough of about 80′. Small gates were provided on the side of the chute and when opened would close the chute at any point and divert the concrete into the forms at that point. The chute was on two tracks about twenty-five feet apart. This made it possible for the workmen to move the chute from one end of the stand to the other and deposit concrete in the desired forms. The ends of the chute were held up by means of wire running over the top of an arch 5′ above the chute and over the track. This gives the entire device the appearance of a suspension bridge. The device was worked up by the contractor and proved very satisfactory and cheap to construct. [*Dec., 1918, p. 194.*]

## Use Less Water

Use that combination of materials in your mix which requires the least water to make it plastic.

You may as well take 3 pounds of cement out of 1 sack batch as to put in 1 pint more water than will produce a workable consistency.—Prof. D. A. Abrams, Lewis Institute, Chicago. [*Sept., 1918, p. 79.*]

## Measuring the Mixing Water

Here's a foolish little kink which worked. When you mix a lot of concrete, you want to handle the water easily and without waste. So you connect the supply to flow into a barrel. Barrel is on the mixing platform, elevated, of course, to feed easily into the power mixer. Let the man whose duty it is to measure the water be stationed on the ground near the barrel, **very near.** That is important. Have the valve within reach of the man. Then measure in the barrel just the amount of water needed for each batch of concrete. Bore a hole in the side of the barrel at this level so determined, right over said man. Even though he is occupied in checking loads of stone, cement and sand, it is surprising how adept he soon becomes in gauging the time when the water is just about to spill—**on him.**—K. E. Hildreth, Syracuse, N. Y. [Sept., 1918, p. 92.]

## Consistency

Many concrete products manufacturers and many contractors will do well to give some special study to the finer distinctions in consistency of concrete. It would be extreme to say that only two consistencies, wet and dry, are generally recognized. But that there are six defined consistencies with wide difference in resulting concrete is not fully appreciated.

Bearing on this is a publication of the Bureau of Standards (Technologic Paper No. 58, entitled, "Strength and Other Properties of Concrete As Affected by Materials and Methods of Preparation").

In outlining the tests, the consistencies referred to in the paper from the driest to the wettest mixture are defined. The definitions are as follows:

*Dry*—Containing just sufficient water to cause the cement and sand to adhere after tamping and removal of the molds.

*Moist*—A mean between the "dry" and "plastic" consistencies.

*Plastic*—Containing the maximum quantity of water which allows the removal of the forms immediately after molding. The surface of the mass shows web-like marks of neat cement and water.

*Quaking*—A stiff mixture upon which water can be brought to the surface by slight tamping. The mass should not flow readily.

*Mushy*—A soft, mushy mixture which is not watery, but can be spaded and readily worked into place in the form.

*Fluid*—A watery mixture which flows readily into place in the form with little or no working.

[*Aug., 1916, p. 39.*]

## A Contractor's Secret

"Our success during the year 1917 has been in selecting the best men we could find, paying the best wages, and being constantly with our men, setting the pace for them to follow," write Shipe & Hoover, of Pittsburgh, Pa. "A caller one day found us engaged in putting in a cellar wall. After watching us for some time he came to me and said:

" 'Will you tell me the secret of having your men work the way they do? I have been all through this section and I have never seen anything like it —nine men doing more work for you than twelve do in most places using a larger mixer.'

"The secret is this: **My partner is at one side seeing that the mixer is kept full, and I am here at the other seeing that it is kept empty.**" [Mar. 1918, p. 104].

## Putting Water in the Mixer First

A concrete products manufacturer puts the water in the mixer *first*—then the *cement*. Mix about two revolutions. Then the sand and rock. Result—as good a mix in 25% less time or 50% better mix in the same time. This is a sure remedy for the "hard center" so often seen in a mixer. This system is as good for hand mixing as for machine, saving one-half the labor. [*June, 1918, p. 206.*]

## Two Men, a Mixer—Plus Ingenuity

Here is one place I used machinery instead of extra labor. I put a concrete coping on a stone fire wall, one story high, 50′ x 2′, and 6″ deep, after putting up a form on each side of a stone wall.

I raised a stiff leg derrick on the front wall, guyed by three heavy wires to nearby telephone poles, then ran a ¾″ rope over pulleys and back to the ground, single strand.

I set my Little Wonder 5 concrete mixer close to the bottom to mix concrete, dumped it into wheelbarrows, and pulled it up on the building with my Overland car. In this way one man on top and myself at the bottom, operating both machines, completed the wall in 2 hours and 15 minutes. You can judge for yourself how many men it would take to handle this concrete by hand. But I find I have to skimp on labor, so I make machinery do the work.—Bruce E. Lewis, Hot Springs, S. D. [Sept., 1918, p. 93.]

## Raised Screeds and Modified Straightedge Simplify Leveling Concrete Floors

During the construction of concrete floors for a building of the Naumkeag Steam Cotton Co. at Salem, Mass., by the Turner Const. Co., N. Y. C., a novel method of screeding concrete floors was worked out. Screeds were placed and leveled above the surface of the floor, which was continuous under them, in some cases the screed was clamped to columns so that there was no break in the floor surface. Guides were secured to the straightedge and worked over the raised screeds. This method allows a man to work to better advantage and with a long straightedge the tendency to bend and throw the floors out of true is much reduced. [*Oct., 1915, p. 129.*]

## A Hopper Helps in Placing Concrete in a Basement

How a hopper can be used to advantage on basement and other comparatively small work was demonstrated on a Chicago basement, where a Standard mixer was set to discharge into a rough hopper, which was arranged so a concrete cart would be filled from it. The advantage of having an easily controlled supply of concrete constantly ready is apparent. [*Nov., 1917, p. 142.*]

## Handling Mixer in Close Quarters

We were bothered a great deal in setting our concrete mixers in close places on bridge work, but finally hit upon the plan of using a small 10-ton screw jack, which solved the problem exactly.

How do we do it? We take a 12″ plank 2 or 3 inches thick, long enough to reach both sills underneath the mixer, place a small block on ground, put jack between block and plank about center of weight of mixer. Screw jack up until it carries weight of mixer, then one man at each end of mixer and the machine swings in any direction. Where it did take us an hour or two to set a four ton mixer we now set it in a couple of minutes.—B. F. Hatfield, Converse, Ind. [*June, 1918, p. 206.*]

## To Prevent Balling of Fine Mix

We recently had to use a very fine facing mixture —rich in white cement, hydrated lime, for waterproofing and fine stone. We found it almost impossible to add water and mix without balling. After running several experiments we found that by running the lime and white cement through a forty mesh screen that we could overcome this trouble. The material for facing was first mixed dry in a power paddle mixer and then dumped into a regular mortar box where

the water was added and all thoroughly mixed with a hoe. This was the only way that we could solve our difficulty. If the water is added in the mixer you have still some trouble with the balling condition.—W. E. Provost. [*Oct., 1917, p. 125.*]

## Minimum of Water

The use of well-graded aggregates results in no gain in strength unless the grading is taken advantage of in using the smaller quantity of water which it makes possible.

It does no good to increase the mixing time unless you use a minimum of water. The use of two or three pints more water than necessary in a 1-bag batch counteracts the beneficial effect of increasing the mixing time from 45 seconds to 60 seconds.—Prof. Duff A. Abrams, Lewis Institute, Chicago. [*Sept., 1918, p. 81.*]

## Splatter Dash Saves Form Cost

I have built here two pump houses, one boiler room and several retaining walls, on which the form work to make a rather smooth and pleasing appearance would have been hard to obtain without a great amount of labor. We have avoided this by using the same forms as we would use for any work, afterward putting a splatter coat on the wall, when fairly dry, of one part cement, one part sand and one part of Joplin chats, with 1 gal. of lime per sack of cement. This makes a pleasing appearance, the rougher the better, as long as the texture is uniform. This was thrown on direct to the concrete with shovel or paddle and has been very successful and has never cost over 20 cents a yard, including material.—D. K. McLeod, contractor, Hutchinson, Kansas. [*May, 1918, p. 154.*]

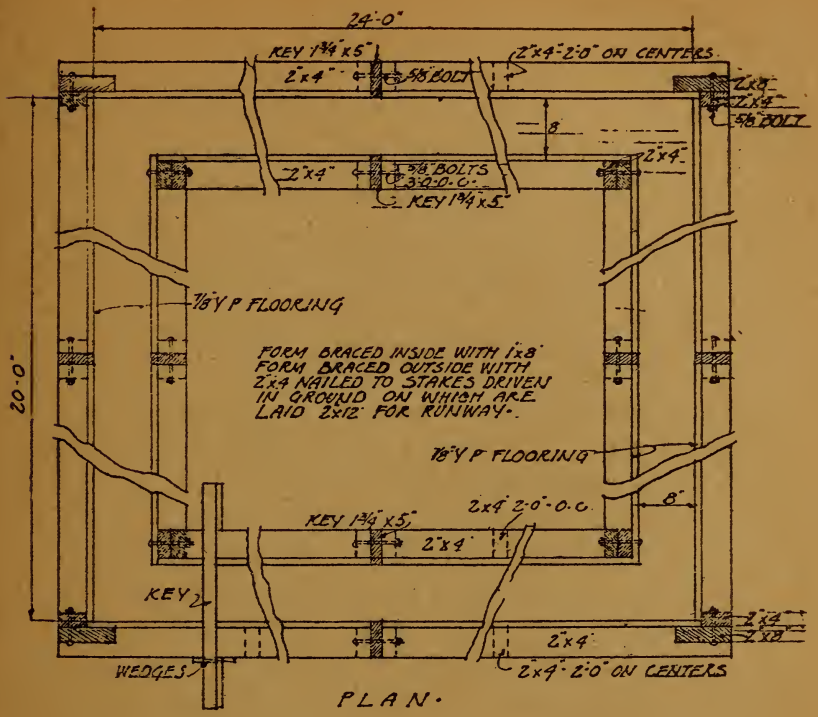
# Form Work

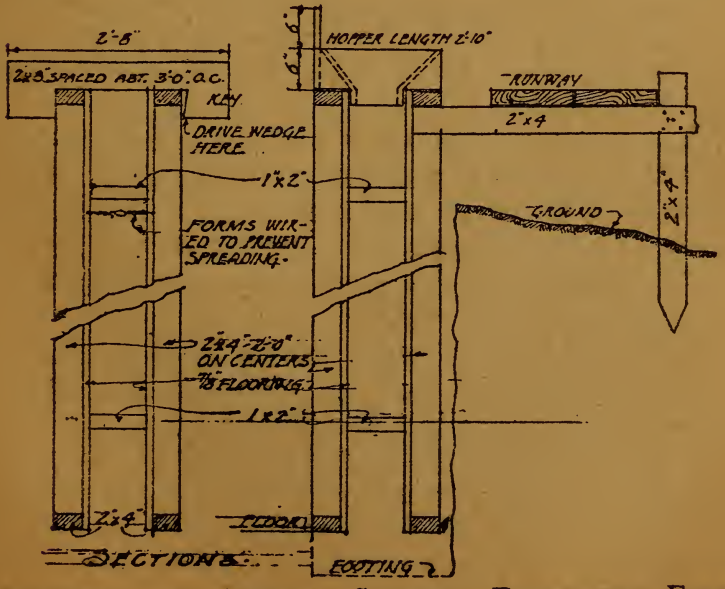
## Making Tight Forms

In making panels for beam sides, column sides, etc., use ordinary Insley column clamps to draw up the boards or plank together. Very often the edges of the boards have a bend in them and the panels would either have wide cracks between the boards or the boards would have to be picked over. The use of these clamps draws up the edges of the boards while the cleats are being nailed fast.—E. D. Steinhagen, Steinhagen & Klinger, Milwaukee. [*Aug., 1918, p. 47.*]

## Unit Forms Speed Up House Foundations

In the construction of 25 frame houses for the Ingersoll-Rand Co., at Phillipsburg, N. J., by the Phillipsburg Development Corp., an interesting feature was in connection with the concrete foundations. Cellars are 20′ 2″ by 24′ 2″ by 6′ 6″, with an 8″ concrete wall. The entire basement form work is in eight panels, two for each side for the inside forms and an equal number outside. A detail shows the way the panels are keyed at the corners and shows how they are bolted. A 1¾″ by 5″ timber as a key is shoved into place between form parts, and this, when bolted, holds the forms securely and tightens them up at the corners. With this system it takes four men 10 to 11 hours to strip and set up the form work. These four men are carpenters, at 60 cts. per hour—cheaper than carpenters with helpers. These men have a little help when the large panels are being carried from one job to another. The runways are set up by two men in two hours and stripped in 40 minutes. The concrete is placed from wheelbarrows in from 7 to 8 hours, and at one setting




HORIZONTAL AND VERTICAL SECTIONS, FOUNDATION FORMS

of the mixer, the work requiring 16½ to 17 cu. yds. The mix is 1:3:5 concrete, of cement, sand and cinders. The wooden forms for these foundations have required no repairs and are giving splendid surfaces, special care being taken in spading the concrete to get a finished appearance, so that no surface treatment is required. [*Feb., 1919, p. 62.*]

## Wedging Flat Slab Forms from Top of the Shores

In flat-slab floor construction the problem of form alignment and leveling is somewhat different than where the beam and girder system is used. In the latter form of construction the different units are usually aligned and leveled by the use of a line and by wedging the shores from the bottom. In the flat-slab system of floor construction, the floor is more a single unit and the use of a line for leveling and crowning is impractical. It is much easier and more accurate to use a level and rod. Wedging can still be done from the bottom of the shores but the erection of the form work is facilitated by wedging from the top.

When wedging from the bottom, the forms must be leveled before the shores are braced or else the braces must be loosened for leveling. By using the system of top wedging, the form work can be erected and braced and the steel reinforcing placed before any leveling is done.

When the floor is ready to be leveled, the level is set up at some convenient place, in a window or on top of an adjoining building or over a column on the building under erection and the target on the rod set to the proper grade. The column heads should be leveled first by reading the rod on the four sides of the column and having two carpenters underneath do the necessary wedging. It is best

to have the floor a little low rather than too high, as it is easier to drive the wedges up a little than it is to loosen them and lower the floor. After the column heads are leveled, the centers between columns are taken and given the proper crown. After this is done, all other wedges are gone over and brought to a solid bearing. The horizontal ledgers are placed at the proper height to be used as a scaffold for wedging.

This method of wedging was used with success on all five floors of the Ford assembly plant at Omaha, Neb.—G. W. Smith, Omaha, Neb. [*Feb., 1917, p. 133.*]

## Concrete Porch Kink

The accompanying sketch shows a small kink we use in putting up concrete porches. When we pour the concrete for the foundation we put in wooden blocks 2′ apart and 11″ from the top of wall.

When we are ready to build forms for floor slab


Detail of Porch Kink

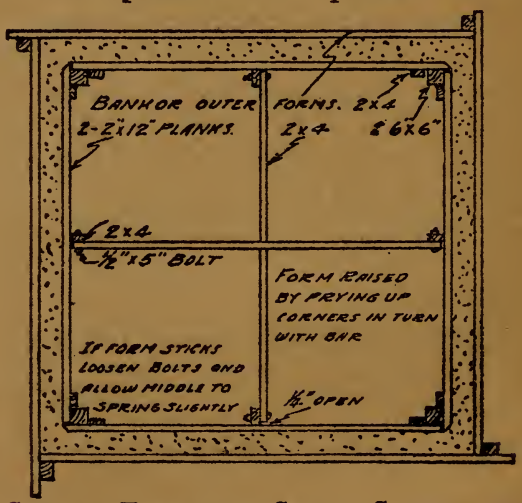
all we have to do is nail 2 x 4's to the blocks and put 2 x 10's on these to carry the floor. This does away with leveling the dirt under the porch, and all shoring and bracing. We have tried this out a number of times and find it is a great time-saver.—M. Dugan Concrete Co., Cincinnati, O. [*May, 1918, p. 154.*]

## Sliding Forms for Small Buildings

Sliding forms are in extensive use on large structures, notably grain elevators and standpipes. These forms are arranged with suitable jacks so that a constant upward movement is maintained at the rate of several feet per day.

The same idea has been applied to small farm structures by J. N. Snyder, Araphoe, Neb.

Mr. Snyder recently built an ice house, which is a 12′ cube inside. The building is nearly all underground. The earth was of such nature that the excavation was cut clean and outer forms were required for but the last two feet of the wall. These were built rigid in the usual way. The inner form was built of four 2′ x 12′ panels of 2″ plank.




Sliding Forms for Small Structures

Mr. Snyder writes:

"I first set a 6″ x 6″ x 12′ post in each corner, 10″ from the excavated wall and about 8″ in the ground and anchored them in place securely at the top. I then made four panels of forms. Each panel was made as follows: Six and a half inches from each end, I nailed a 2 x 4 flatways to form a guide to keep

the forms in line. In the center of each panel I nailed a 2 x 4 edgeways. These had ½" holes to which I bolted a 2 x 4 cut slightly less than the inside dimension of the forms to give play room when raising them. I then set my forms in place, bolting my 2 x 4 cross braces in place (see sketch) and filled the forms with 1:5 concrete mixed to a slightly quakey consistency, tamping thoroughly. I then raised the whole form 1′, the remaining foot of concrete being sufficient to hold the forms and allow placing and tamping of another 1′ layer. I continued raising, filling and tamping until the top was reached. A short carpenter's bar was used to raise the forms using longer heel blocks at each raising.

"The walls were reinforced horizontally against earth pressure.

"With one other man I made the forms and completed the walls in one day, using a mixer and chuting the concrete into place.

"I can recommend this type of form for structures up to 20′ square and walls may be carried to any height." [*June, 1918, p. 222.*]

## A Porch Rail Kink

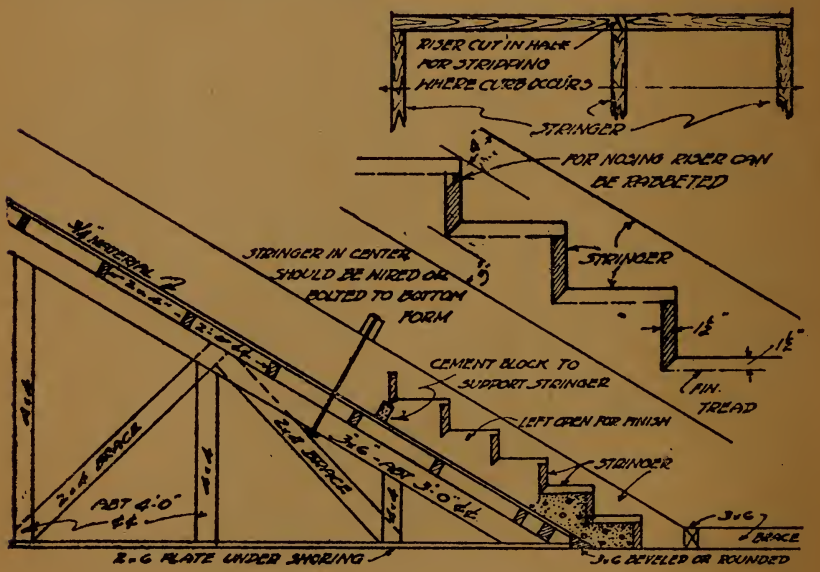
In building a concrete porch under an old roof, the concrete spindles were made with fine sand, about 2 sand to 1 of cement, of a dry mix so mold could be removed immediately. The lower part of the railing was made in arches by mixing a little lime with fine sand and making a bank where each arch comes through in the bottom railing. The concrete was put in the forms over the sand banks and the spindles set on the green concrete; then another form with a hole cut to fit over the top of each spindle; then the top form was filled. The sand cores were washed out after the removal of forms. —Scott Healey, Otsego, Mich. [*Oct., 1918, p. 130.*]

# Building Stair Forms

The method I use for forming stairs is shown in the sketch and is good either to finish at time of pouring or to allow for placing marble or other materials afterwards.

Safety treads should be placed after concrete has been screeded off; curb or nosing bars should be tied on the risers before placing concrete. You will notice that risers and stringers clear the finished treads, in order to finish treads if desired at the time of pouring.

Ends of stringers are braced, and at center of run they should be wired or bolted to prevent springing up if concrete will be placed fast.




Mr. Muller's Stair Forms

Concrete should be placed starting from bottom, working up, keeping ¾" below finished tread to allow for mortar or safety tread, and should be stiff enough not to run too free and at the same time fill all voids and should be thoroughly tamped and worked while being placed.

Risers and stringers can be stripped the following day for finishing risers and curbs.

It is much cheaper and easier to place stairs after the floor above is poured.

On a large job it is easier at times to mix material by hand at stair being poured, and place it with buckets or shovels or a small chute.

I used this method on an office building and school at Balboa, C. Z. The school stairs had safety treads, the office building a cement finish with rounded edge. —Jack A. Muller, General Foreman, Building Div.. Panama Canal.

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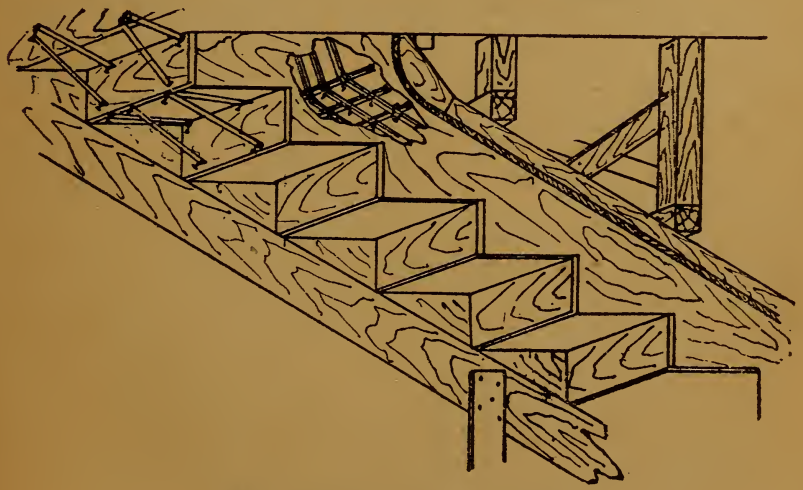
The installation of reinforced concrete stairs is an open field for ingenuity. Considering economy, stability, simplicity of construction and speed, I have found the following design (Fig. 2) most adaptable.



Mr. Alley's Stair Forms

Built soffit of 7/8" shiplap laid horizontally on 2" x 6" bearers, supported by 4 x 4 headers on 4 x 4 shores placed as weight and length of stairs requires, shiplap to extend 6" past stair line on both sides, then nail a 2 x 6 flat to clear stair line 2".

Lay out the risers and treads on smooth side of 2″ plank stringers, risers to slant in or toward stair slab ½″ if without nosings; place the stringers on the slab and set the risers, beveled at the bottom to allow free use of finishing tools. Risers are to correspond in length to finished rise and are set flush with the finished tread.

Place one 4 x 4, or more, if width of stair requires, longitudinally in the center of the stairs, and wire firmly through the slab to headers beneath to prevent floating; use 4 x 4's as clamps across stringers and wired to headers, spacing to be determined by thickness of slab and width of stairs.—C. C. Alley, Concrete Foreman, Philadelphia. [*Oct., 1918, p. 129.*]

## Waste Molds in Situ

Where labor is cheap and a few men can be trained for a proper knack for their work, some elaborate things can be done with concrete trim cast in place.

C. B. Brun, New York architect, some time ago built a large reinforced concrete house in Cuba. The exterior treatment of cornices, parapets, balustrades, etc., involved a good deal of ornamentation to be cast in place as a structural part of the work, with the advantage of a good deal of repetition of design.

The ornamental features were modeled in clay; plaster molds made, glue models cast in the plaster molds and as many waste molds of plaster cast as there were repetitions in that ornament. Then plaster molds were secured in place as a part of the form work. A very fine smooth mix was first thrown into these ornamental molds, completely covering the surface, and this immediately backed up with the regular mix. When the plaster was chipped off there were, of course, surface imperfections and

some unevenness of color. The finish was made by a grout wash of a creamy consistency, sopped on and "sponged" in with a wad of cheese cloth. [*July, 1918, p. 26.*]

## Another Cap Form Detail

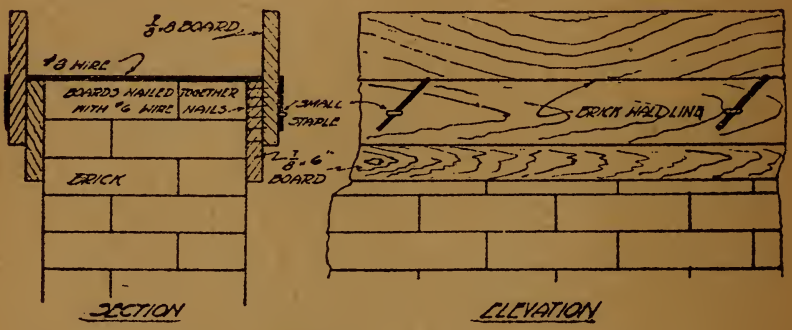
Your kink for "Building a Cap of Concrete," in my humble opinion, is not practical; it can only be used in rough brick work; in front brick work the joints are too close to get a lath in between the bricks.

In concrete walls please tell me what will happen to said lath after some "wop" hits it with a shovel or dumps a cart load of concrete on the lath. Then the mason contractors in this section are not so kind as to do any extra work in putting in lath, and unless you want to keep a man there to put them in, you would find the lath in a nice little pile; that is, if the masons did not take them home for firewood.

What I believe to be a better method, and one we have used for years for such work, I show in accompanying sketch. It is built up as required and we have used it with overhangs up to one foot. Holes are drilled about 2′ apart and No. 8 wire or pencil rod, which every concrete man uses for form work, is put through the holes, one end bent over and held with a staple, the other end drawn tight with a hammer, the same as if you were drawing a nail; when tight, it is bent down and held with a staple, the same as the other end. As you can readily see, you have a form for any kind of wall, the form being built on the cantilever principle, and the more concrete put behind it the tighter it holds. There are no clamps, braces and in fact nothing in your way at any time while working or finishing the top. If desired, spacers can be used to hold it apart on the top until the concrete is placed in the form.

This form, if the wall is anywhere near level, will level itself, and in the five years we have used this method have always found it true and level.

To remove the forms the staples are drawn out and the wires are bent up straight and forms pulled off;




Detail of Cap Form

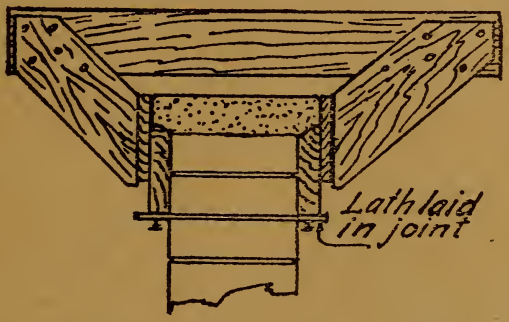
the wires then can be cut off close to the wall under the overhang, or drawn out if the cap is not too thick or wide.—R. Shannon, J. H. & R. Shannon Co., Jersey City, N. J. [*Sept., 1918, p. 93.*]

## Building a Concrete Cap for a Wall

Few jobs are more common than placing a concrete cap on masonry walls of various kinds, yet it is surprising how few concrete workers know how to place this form work accurately and rapidly and without the use of a great amount of bracing.

The methods described are available for masonry walls and by the use of a little foresight in poured concrete walls. The illustration shows that a line of supports consisting of wood laths are laid in the joints of the wall a few inches below the bottom of the cap. With concrete walls this could be arranged by allowing the lath to run through the walls and through the form work by notching between the boards. These

laths form a support strong enough to carry the forms for the cap, as shown. It is obvious that the forms can be leveled by the use of wedges between the lath and the form boards, and that a nail driven up through the lath will hold the forms securely to line.




Securing Cap Forms to Wall

Spreading can be taken care of by tacking strips across the forms. It is, however, often desirable to be able to finish the cap before removing supports of this kind. If form clamps of some type are not available they can be improvised from odd bits of lumber along the lines shown in the illustration. [*Feb., 1917, p. 51.*]

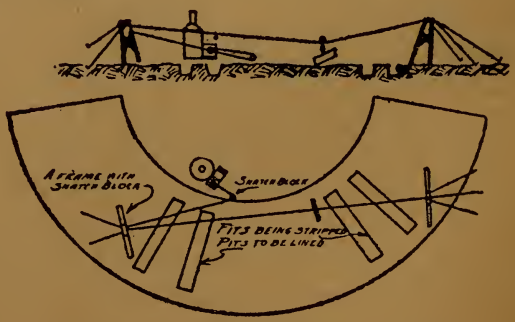
## Putting Panels in Posts

In making concrete gate posts to be used on a large country estate, the following method served to place an attractive panel in the road side of the posts. We made a form with pyramid top, laid on the molding floor. The usual corner strips were nailed in, with the sides of two of them flush with the edges of the form side members. A rectangular frame of ¼″ strips, outlining a panel, was then positioned on the bottom form board and tacked in place. A thin wash of fire clay—though any clay will serve as well—was then run into this panel to a thickness of about ⅛″ or so, when wet. Broken stone, as used for the aggregate, varying in size

from ¾″ to 1½″, were then placed in the clay, with a flat surface next to the form. When the clay had hardened somewhat the rectangular form of strips was removed, a bucket of mortar served with care covered the stones and the rest of the form was then filled in the usual way. Reinforcing to the extent of four corner bars did not interfere with the placing of the panel. On removing the form, brushing out the clay and washing each post with a neat mortar coat, a rather good looking ornamental post was achieved at little additional cost over the ordinary unpaneled ones. The faces of the stones in the panels were placed irregularly, but the idea might well be carried out in mosaic or initial patterns, and with regular or uniform faced pieces. However, for the purpose desired, this irregular aggregate gave an attractive effect.—K. E. Hildreth, Syracuse, N. Y. [*Aug., 1918, p. 71.*]

## Moving Forms with Trolley System

In constructing a 22-pit roundhouse it was necessary to move the heavy panel forms distances up to 600′, which, over the broken and obstructed ground, was a very heavy task.




How the Trolley was Rigged

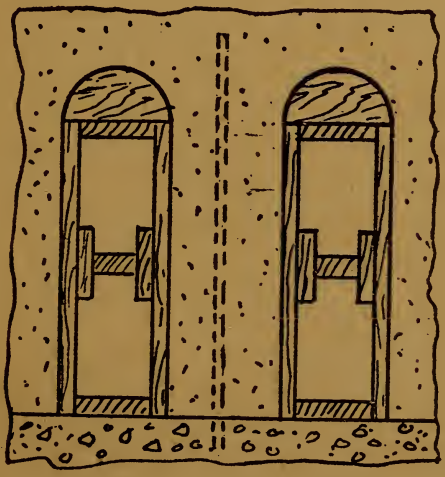
To make the work easy, two easily moved A frames were used, which were set in suitable locations to bring a cable stretched between them over the forms and the point where they were wanted.

A single line from a hoisting engine was passed through snatch blocks and secured to the further A frame. A trolley traveled on this line and by slacking the line the forms were picked up with tongs and the line tightened, which raised the forms and allowed them to be transferred easily as desired.

Lumber and other materials were also handled easily and cheaply by this rig which was made by W. E. Burdett. [*Mar., 1918, p. 106.*]

## A Handy Balustrade Form Detail

The illustration shows how forms for a bridge balustrade were built. L. M. Edwards used them on the Olympia Island bridge, Toronto, according to the *Engineering Record.*

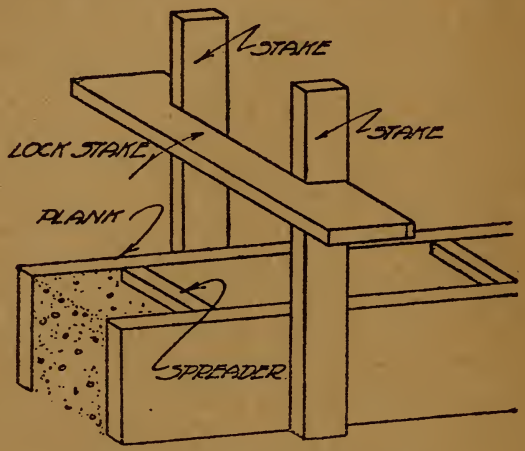


Balustrade Forms That Come Out Easily

The sketch is self explanatory. With one side of the balustrade forms removed the wedges and blocks that hold the little arch forms apart are removed and out comes the form. [*June, 1918, p. 206.*]

## Curb Form Kink

In building curbing (not gutter), use stakes that stick above the forms at least a foot, put a spreader between the planks and draw the stakes toward each other and put a lock from stake to stake, instead of




Detail of Curb Form Kink

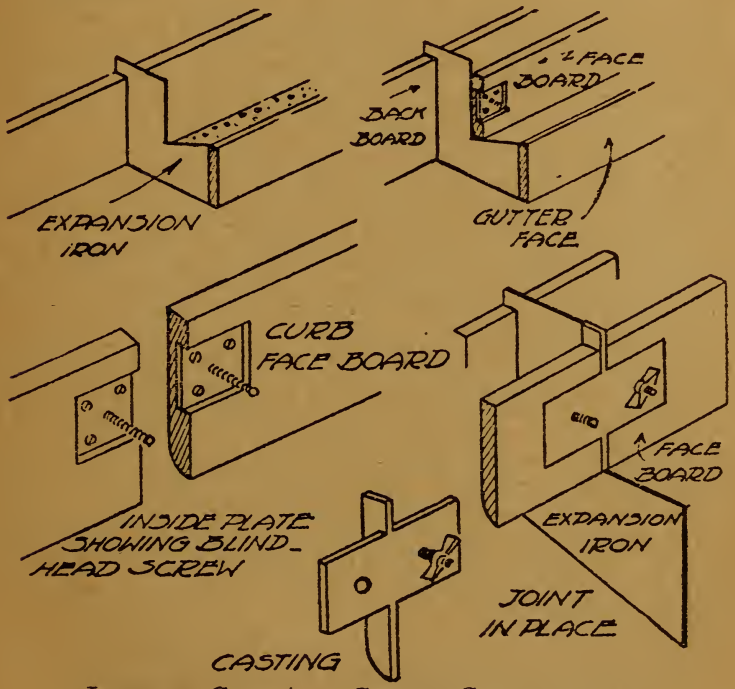
nailing a cleat across. The locks are made by notching strips of wood, and are quick to put on or take off, and leave room to finish the top.—Scott Healey, Otsego, Mich. [*May, 1918, p. 154.*]

## Forms for Curb and Gutter Construction

I have what I think is a good thing in the building of combined curb and gutter of concrete.

I have been at this kind of work for six years and in starting out I copied usual methods of construction, but I soon came to the conclusion that there was an easier way to get the expansion joint plate out than by taking down the front facing plank to allow the removal of the iron. I wanted to save the cost of one man facing up the curb, after the front facing plank came off. That way of finishing is not good for concrete anyway, as it should not be disturbed after it has been put in place, with a proper facing.

I worked out the idea that is shown in the accompanying illustration. I used pine plank, 2″ x 7″, and got them molded out in the proper shape at the factory and cut them 8′ long. This is the length of the block in my city. I then set a stud in each end of the facing plank, having a casting made to fit in the end of the facing plank. This I fastened in with a thumb screw, which makes the form thoroughly rigid when ready for concrete.




Idea for Curb and Gutter Construction

When the sub-base is prepared and the back plank, 2″ x 12″, is put in place and securely fastened, any intelligent boy can finish setting up the forms faster than a crew of eight men with a small mixer can put in the concrete.

After the back form is set up the remainder is as easy as hanging clothes on the line, and you will have curb and gutter absolutely straight, with a proper

grade, and no water remaining on it after it is done. Before the iron clamps are taken off, that is, the clamps that hold up the facing board, and while the concrete is deposited, a small piece of 2-in. board strapping is nailed on the face board of the gutter form to hold up the facing plank until the concrete sets, then back off the thumb screws, back off the casting, which only takes a few minutes; haul out the joint iron and the job is done.

My front facing planks I have used for six seasons and they are as good today as the day they came from the factory. By keeping them well oiled, they will last a long time.

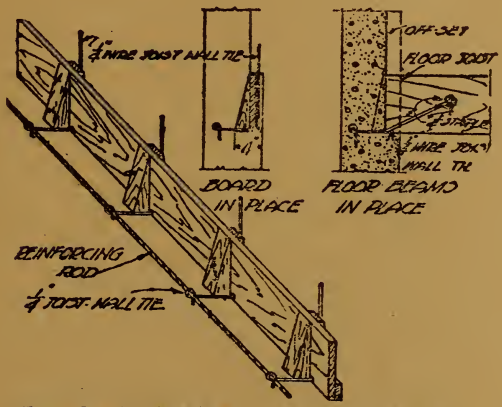
With this method of construction, when the form comes off, there is a good smooth face, and as the coarse aggregate and fine aggregate are all mixed together, there is no danger of crazing or hair cracking any time in the future.

George McKnight, city engineer of Fredericton, N. B., says: "I have used these forms this summer and find them very reliable, particularly the joint irons, which can be removed without disturbing the concrete in any way. The method used to fasten the joint irons to the form makes a positive level surface on the curb."—J. Mal. Chappell, Fredericton, N. B. [*Apr., 1917, p. 141.*]

## Providing Bearing for Floor Beams

In the concrete walled houses at Claymont, Del., built by the Morrill system with steel forms, for the General Chemical Co., the first story walls are 8″ thick, dropping back to 6″ at the second story. In order to get a 4″ bearing for the floor joists, and to form the offset to the 6″ wall, beveled blocks, 2″ x 8″, were tacked to a form board (see sketch); the form board,

with the beveled blocks attached, was set in the steel form at the required level. Quarter inch wire anchors were bedded in the wall and left with ends projecting.



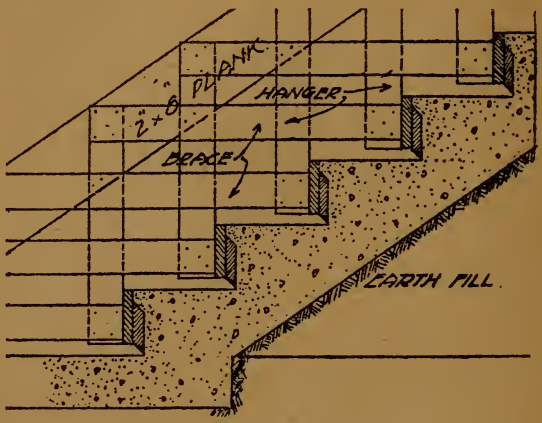

Bearing for Floor Beams

When the wood floor joist were put in place these wire anchors were spiked to the ends of the wood joist. [*Jan., 1919, p. 17.*]

## Handy Step Form Detail

To build concrete steps between walls I lay out the steps on the walls, then place heavy plank, say 2 x 8, one against each wall, where the end of steps come only about 8″ or 1′ above the line of steps, as each face form or riser form is separate. Nail a hanger or strip of board 2″ from the ends of the riser form and place the riser form to the mark on the wall, and nail hangers to the plank. Then nail a brace

from the plank to the form in a horizontal position, start at the tip and place all the forms in and concrete from the bottom up. I make the forms out of 2 x 4 and nail a board on outside of 2 x 4 to get height of riser and a projection, put in a quarter round (or



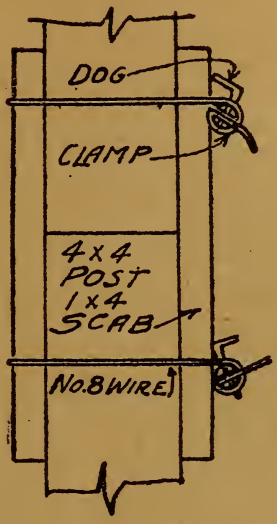

STEP FORM DETAIL

use beveled board—see sketch—Editor). Each form is set 1/8" high, so the trowel will go under the 2 x 4. (The lower bevel—see sketch—helps the finisher.—Editor.) Each form is cut 1/4" short. They drop out on removing the braces.—Scott Healy, Otsego, Mich. [*May, 1918, p. 154.*]

## Form Clamps for Splicing Shores

To save the time and prevent waste in splicing shores, the H. O. McMillan Co., Minneapolis, used wire and M. & M. clamps, as illustrated. This arrangement allows the splice to be made with two pieces of 1" x 4" lumber. A single nail at each end of each "scab" is used with a nail collar, so there is no loss of lumber whatever in wrecking.

A test made on this joint resisted 37,210 lbs., and the break was 10″ below the joint. A second test on




Shore Splice with M. & M. Clamps

two 4 x 4's clamped side by side with two No. 8 wires, started them sliding at 2,750 lbs., and the joint failed at 5,850 lbs., after sliding 6¼″. [*Apr., 1918, p. 45.*]

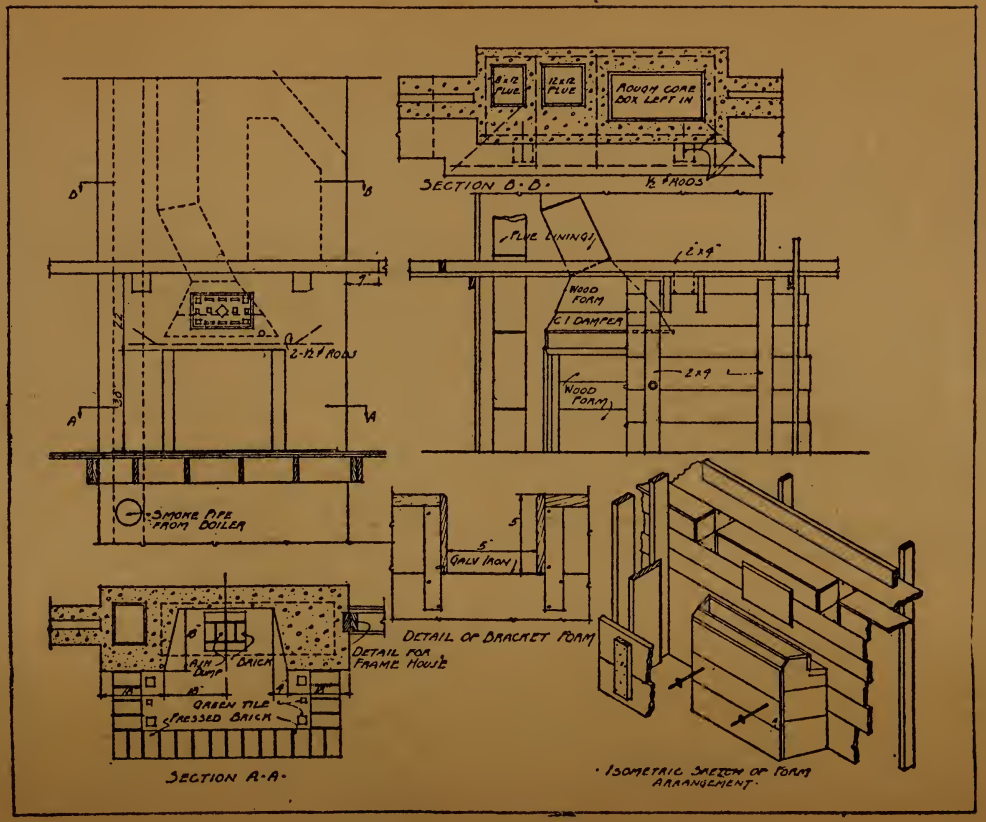
## Concrete Fireplace Forms

Concrete for fireplaces offers a pleasing variation from brick, especially for rugged effects.

The illustration details the form work for the fireplace, illustrated in the January, 1918, issue of Concrete, page 14.

This fireplace, as built, was in a house having concrete walls and floors, but details are shown adapting its use to frame construction. The design is plain and the forms simple.

Two pairs of vertical planks determine the thickness and relation to the house walls. Against these




DETAILS OF FIREPLACE FORMS

verticals are built the mantel forms of dressed lumber. The small bracket forms are of wood and sheet metal set in notches in the main forms, which are undercut, as shown, for clearance in stripping. The bracket forms are secured by strips accessible from the outside.

The form for the fireplace opening is drawn in at its top to conform to the cast iron damper, and provides for the face of the fireplace to drop below the level of the damper. The entire job is well reinforced as shown by the drawings and by odds and ends of wire and rods throughout.

The concrete face consisted of a washed sand and gravel having all the pebbles between ¼" and ⅜" that could be put into the mix without voids. Concrete was placed from the outside in a semi-dry mix, the back form—a plank panel was raised as concreting progressed.

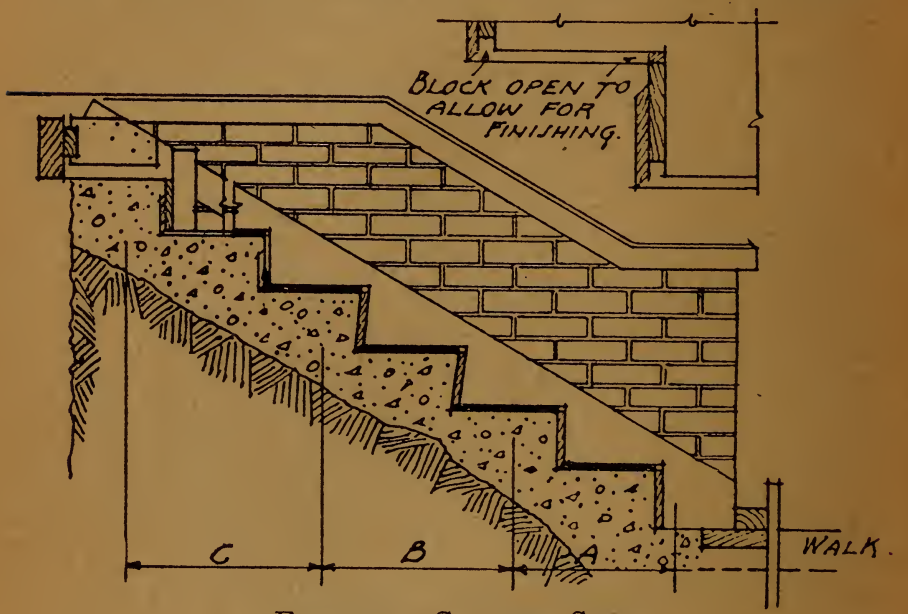
Forms were stripped in 24 hours and the face of the work scrubbed under a stream of water to expose the aggregate. The mantel shelf was faced with sand mortar and when hard rubbed smooth with a carborundum brick.

The ornaments on the panel and hearth are green, hand-made tile, and the row of red brick that borders the hearth is raised about 1" to retain ashes. A row of brick surrounds the ash dump, since they can be more readily replaced than concrete when cracking eventually comes at this point.

The concrete above the mantel was left rough and plastered with the rest of the room, while the outside received a coat of mortar and was dashed with the exterior of the house. [*Oct., 1918, p. 116.*]

## Forms For Concrete Steps

To build concrete steps that will give satisfaction in service depends, so far as the design of the forms is concerned, upon the correct proportioning of the steps, so that they will "step easy" and look well, and upon so building the forms that the concrete




FORMS FOR CONCRETE STEPS

can be placed and the forms removed with minimum labor.

Many of the badly proportioned steps too often seen are the results of the attempts of masons and handymen to build their own forms, without a proper knowledge of carpentry.

A good carpenter's rule for stair proportioning is that the rise and run of the step in inches, when multiplied, must equal as nearly as possible 66. Thus a 6″ rise calls for an 11″ tread, and a 7″ rise for a 9⅜″ tread. This is the stringer cut and exclusive of nosings. For exterior concrete steps,

where space permits, it is good practice to use this rule and then add 1″ to the tread width. This does not greatly change the "easy walking" qualities and adds to the appearance of most exterior work. Keep the risers low when possible, between 6½″ and 7½″.

Concrete steps can be roughly divided into those built between walls or buttresses and those where the ends of the steps are open, with or without returns.

Where steps are built between buttresses, the buttresses are generally built first and the steps built between them. This simplifies the forms and provides joints at the ends of the steps in case of settlement.

Assuming a typical set of house steps, it is found that the vertical height from the walk to the top of a veranda floor is 33″, while the run of the string is not limited, but can be laid out to present the best appearance. The 33″ of height evidently calls for five risers, which are 6.66″ high, or to the nearest ⅛″—6⅝″. The tread width, according to the rule, is 66 ÷ 6.6, or 10″, but may be increased to 11″, and if a nosing is to be used, the exposed tread will actually be 12″, because of the under cut to make the nosing.

To lay out the string, take a 10″ plank and with a square lay out the string exactly as for wooden stair strings, as a working base. The actual cutting will depend upon the shape of stair to be built, and the riser forms. Three common forms are illustrated (a) a perfectly plain square step, (b) an undercut step, (c) a step with nosing. The cut of the riser in the string will vary from the layout line to accommodate the forms, as shown at a, b, and c.

In practice the allowance for the forms, except in the case of type b, does not actually affect the

cut, except at the top or bottom, where a bearing is provided for, to support the forms; that is, the thickness of the riser forms is allowed at the ends of the string.

The strings can now be sawed out or, as is often done, a skeleton string, indicated at c in the illustration, can be made by nailing strips of odds and ends to a 2 x 4 or 2 x 6, using the marked string as a pattern. If a solid string is used, it is well to set the riser forms 7/8" below the actual lines, by means of a little block tacked to each string above the riser form. This provides a space of 7/8" for troweling, so that the tread can be finished before the forms are removed.

Riser forms should be beveled at the bottom, as shown in the illustrations, for the same reason, unless a cove corner is desired, when the riser board is rounded, as shown at c. The appearance of most steps is improved by a nosing which is easily made by the use of a riser board in two sections. This is a convenient arrangement, because, having made the forms, they may be adjusted to the exact height required, and can frequently be re-used. In setting the forms allowance should be made for the pitch of the treads, which should be about 1/8" from back to front. This can be done by setting each riser form 1/8" higher than the top of the one below it.

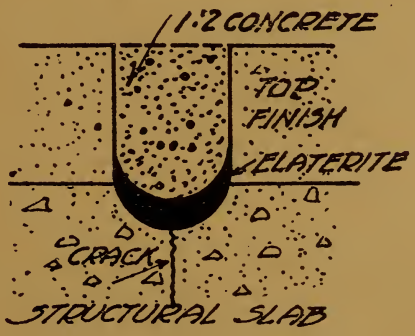
Care is necessary in finishing the treads to see that this pitch is maintained and that in settling a hollow is not formed in the middle of the tread. The pitch of the steps makes them easier to the user and serves to drain off water rapidly.

Steps with open strings, without buttresses, while more complicated as to form work, in general simply involve the return of riser members in some form. Such steps present individual problems according to their design. [*Nov., 1917, p. 151.*]

# Floors, Sidewalks and Pavements

## Filling Leaky Cracks in Floor

After a very large reinforced concrete laundry building was completed, the topping of the floors (put on at the time the slabs were poured) began to show cracks running through the whole thing. Water naturally seeped through. The cracks were too small to permit their being filled with anything that would stand expansion and contraction. Cutting them out and filling with asphaltum compounds was out of the question for several reasons, so here is what I did.




How Cracks Were Filled

I had the cracks cut out just about 3/8" wide and 1/2" deep, the cut always having the crack in the center.

After all dust had been blown out I hardened the cut with a liquid concrete hardener. This was to make every little protruding chip strong and also to prevent any possible action on the asphalt. Then the cracks were washed out to remove the deposit that the hardener had produced. When perfectly dry I ran a blow torch in the cut to warm it and poured about 1/4" of Elaterite, well heated, into it. It was poured in such a way as not to imprison air and made

to stick to side in a convex manner (see sketch). Then I filled the cuts with water and when thoroughly soaked, filled them in with 1:2 concrete. Then a few days later I rubbed them down with carborundum and hardened them like glass. The asphalt stands all the working and the concrete filling the trucking. These cracks in places are under terrific strains and the 2,000 lin. ft. of them are perfectly tight. Above the boilers is a washroom and the floor is hot and they flood it with cold water, etc. In each panel were, say, four cracks. Two stay perfectly tight and cannot be detected. One or two act as expansion joints. The concrete that I put in and the edge of the old floors are so hardened that even when they open no trucks damage them and they are absolutely tight. Being rubbed smooth, the trucks don't jar and hurt them.—Robert B. Lammens, Los Angeles, Cal. [*May, 1918, p. 153.*]

## How New Floor Surface Was Laid

I had to put a new surface on a concrete floor where a composition floor had gone bad.

I chiseled some of the old concrete off, so that I would not put less than ¾″ of top on, then stretched a wire netting (chicken fence wire) and fastened it to the concrete and gave the concrete a good wetting and kept it continually wet, as there were four steam pipes running through the 8′ x 12′ room, also heat from the room below, which kept floor warm. Next morning I again wet the concrete thoroughly, then scattered neat cement over it and broomed it so that cement paste covered all the old concrete. Then I proceeded to put on the top (1:2). I took care that the old concrete was always wet, swept a neat cement grout over it and troweled some of the mortar in. As soon as it was ready to finish I laid it off in blocks 25″ square and cut the

top with my pointer clear down to the old concrete, just as I would have jointed it off with the jointer, but I didn't use the jointer.

Then I troweled over the cuts. As the floor was finished there were no cuts to be seen. Two days after, very fine hair cracks appeared where I had cut the top. They could hardly be seen except by stooping down and looking for them. No other cracks have appeared except in the corner where the steam pipes were and where the top had dried too quickly and a few heat cracks appeared. Otherwise the floor is sound and solid.

I have never before seen this method suggested. There are floors laid with joints, but they have objections, whereas the hair joints that I made leave the floor smooth and level and are quickly and easily made.—A. K. Siebrandt, Pendleton, Ore. [*Apr., 1917, p. 170.*]

Patching Concrete Pavement

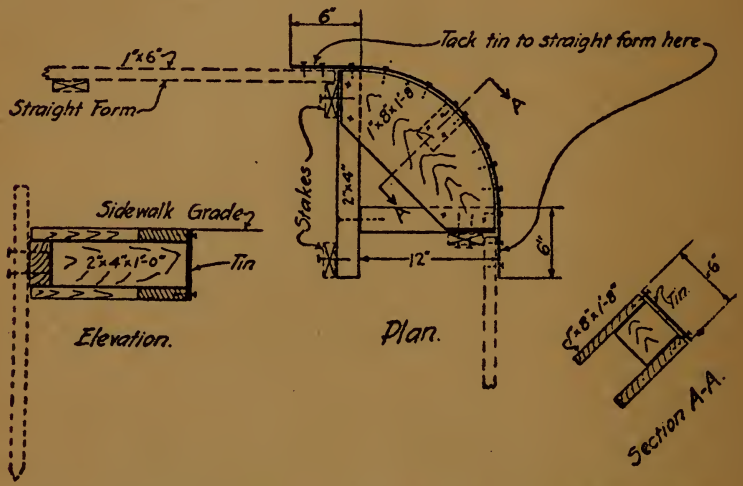
## Patching Openings in Pavements

Whenever it is necessary to cut an opening in a concrete pavement for sewers, etc., it frequently happens that the patch develops cracks. This is no doubt due to the variation between the old and the new mixtures and the settlement of the freshly loosened earth.

The accompanying sketch indicates my method of eliminating the tendency to crack. The concrete is simply laid in the form of an arch.—H. L. Laughlin, Chicago. [*Feb., 1917, p. 52.*]

## Re-Usable Corner for Sidewalk Forms

Forms for concrete sidewalks with curves of very short radii are troublesome to set up at the curves. At such curves as those made where approach walks splay into the main walk, made-up form curves, as shown in the illustration, can be used to good advantage.




DETAILS OF RE-USABLE CORNER FOR SIDEWALK FORMS

A frame of two pieces of 2" x 4" carries two boards whose outer edges are cut to the shape of the desired curve for the walk. A piece of tin or sheet iron is nailed to these edges of the boards to form the curve of the form. The straight parts of the walk forms are set up and the boards at each corner sawed off to let the corner form in afterward. The corner forms can be used repeatedly.—J. L. Cozzens, Philadephia. [*May, 1918, p. 153.*]

## Bonding New Top to Old Sidewalk Base

When an old sidewalk surface goes to pieces I suggest that all topping that has gone bad be taken off, and the surface be cleaned, washed and scrubbed thoroughly with a wire brush so that no particles of concrete or other material will be left on the old surface.

Then mix a top course of 2 parts cement and 3 parts clean, sharp, screened sand, but before applying this top coat, thoroughly wet down the whole concrete surface with water and sprinkle with neat cement. Use an old broom and brush this neat cement thoroughly into the concrete base and while it is moist, follow up with the top coat. Before this is rodded level, trowel a small proportion of the top coat thoroughly into the concrete. This will eliminate any chances of air cells and air pockets between the top coat and concrete base. Then finish the top coat by rodding it to the proper heights and grades. When the top coat is troweled, it should be finished with the fewest possible operations, as the more it is troweled, the more it will have a tendency to draw the water out of the top finish and loosen it from the base.—Frank L. Shoemaker. [*Aug., 1917, p. 51.*]

## Do Away With Cinders Under Sidewalk

It is pointed out by a reader of CONCRETE that in spite of its futility, cities still continue to specify a cinder sub-base under concrete sidewalks. Cinders were originally included for the purpose of providing adequate drainage, thereby preventing heaving from frost. When frequent side drains to sewers were placed, they probably served some purpose. But now side drains are no longer required and the sub-base has really degenerated into a water basin, into which water flows from all the surrounding soil.

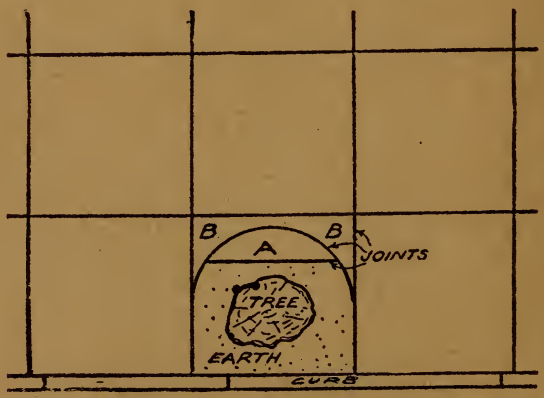
If the natural soil drainage is good there is no need for a cinder base; if the drainage is poor, a pocket is provider for collcting water. In expense, a sub-base not only involves the cost of the cinders, cost of hauling, cost of handling and placing, but also the excavation of the soil for a depth of 9″ to 12″ and its subsequent disposal.

Concrete sidewalks have been in successful use in all climates and over all soil conditions, without any

special provision for underdrainage. Since it is a needless expense and consequently more than worthless, the cinder sub-base requirement should be eliminated from every sidewalk specification. [*June, 1918, p. 205.*]

## Sidewalk Joints Around Trees Will Prevent Cracking

The accompanying illustration from *Contractors' Atlas* shows a method used in Albany, N. Y., to provide space for future growth of trees. If some provision is not made in concrete sidewalks, cracks may be caused by expansion of the tree trunk and roots.




JOINTING SIDEWALK AROUND TREES

As the tree trunk grows in size, the section A is removed by hand—or the roots themselves raise it—and still later, if necessary, the section B may be removed. The joints at each of these sections allow this to be done without cracking or disturbing the adjoining slabs of the sidewalk.

The joints may be conveniently formed of one or two thicknesses of tar-paper. This completely prevents any bond between sections A and B and the balance of the sidewalk. [*June, 1918, p. 206.*]

## A Combined Culvert, Sidewalk, and Curb

A storm sewer of unusual construction has recently been completed at Ann Arbor, Mich., under the direction of Manley Osgood, City Engineer, Ann Arbor, Mich.

Conditions were such that it was not necessary to use a deep excavation so, a combined sewer, curb and sidewalk was decided to be satisfactory and economical. The grade of the invert follows a uniform pitch but the grade of the cover which also forms the sidewalk is varied to conform to local grade. The invert and the walls are 6″ thick of plain concrete, while the 6″ slab top is reinforced with 15 sq. in. of reinforcing per lin. ft., placed in the form of mesh. The invert was placed by grading the excavation and sweeping the concrete to shape by templates. Wood forms were used for the vertical walls, the sides of the excavation serving as a form wherever possible. In placing the top the surface was finished as a sidewalk and the edges, which serve as a curb, were finished to below grade.

The total length of the sewer was 1,350′. The excavation was mostly in stiff clay, which held up and did not require outside forms, but a few soft spots required outer forms.

COSTS OF SEWER AND SIDEWALK

| | |
|---|---|
| 1,640 cu. yds. excavation @ 65 cts. | $1,066.00 |
| 9,646.4 sq. ft. reinforcing @ 2 cts. | 192.93 |
| 540.6 cu. yds. of concrete @ $8.45 | 4,568.07 |
| 110.5 lin. ft. of 12″ pipe @ 33c. | 36.47 |
| 3 tees, 12″ @ $1.00 | 3.00 |
| 5 elbows, 12″ @ $1.00 | 5.00 |
| 7 iron box inlets @ $12 | 84.00 |
| 8 cast iron covers @ $5.50 | 44.00 |
| 8 cast iron covers @ $5.50 | 44.00 |
| Minor extras | 51.63 |
| Total | $6,051.10 |

A construction gang of 8 men to 10 men was employed and a paving mixer was used which discharged directly into forms. The contractors were Barnes and O'Neil, Allegan, Mich. [*Nov., 1916, p. 159.*]

## Gouge Soft Spots Out of Concrete Pavements

In laying concrete pavements, after the top has been surfaced and left to harden but before the covering of earth is thrown on, a careful inspection of the surface should be made. By the time the concrete has set long enough to sustain a man's weight without showing, small bright and shining spots will be seen on the surface. They may be few and far between or there may be a great number of them. If the inspector will insert his pocket knife into these bright places he will find them soft in comparison with the rest of the surface. It will be found that these soft spots are earth or some kind of clay or loam, or a lump of sand, wood, coal or soft stone. All this soft material should be dug out, the holes cleaned and then filled with fine and rich concrete filling the holes a little more than full. In spite of all the care possible in providing clean and pure material, it is impossible not to have some foreign matter get into the concrete, and the adoption of the foregoing kink will prevent many a hole in the surface of a concrete pavement, especially if the stone constituent of the concrete is gravel.—Walter E. Emery, Supt of Highways, Peoria, Ill. [*May, 1918, p. 155.*]

## Double Diking for Curing Concrete Roads

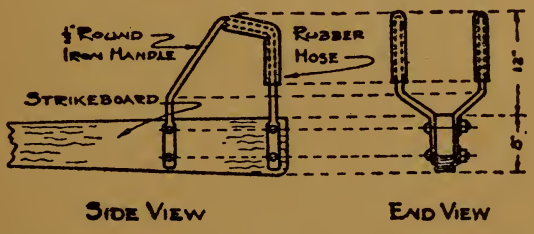
Wherever concrete can be cured by ponding, that method is to be preferred over all others. California was probably the first state to practice the flooding of the finished concrete pavement with a view to keeping moisture present, to enable the concrete to acquire strength and hardness under proper conditions.

Even where water is obtainable for use in this manner it is of course desirable to prevent unnecessary loss. This is particularly true in hot climates, where evaporation is rapid and where scarcity of water more often prevails.

The original method of diking roads in California has been improved upon by adding an additional longitudinal dike near the edge of the concrete. This prevents unnecessary loss of water and gives double assurance that concrete will be covered at the crown of the pavement as well as at the sides. These two precautions are very essential and the added dike seems to make the desired ends more certain. [*Nov., 1916, p. 154.*]

## Strike Board with Raised Handles

In the construction of the Duwamish-Renton Junction Road, laid this year by R. M. Hardy in King County, Washington, the workmen raised serious ob-

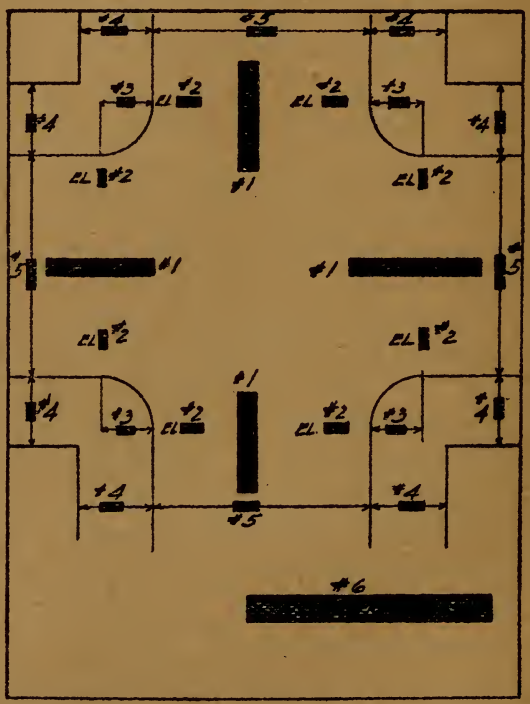



Strike Board with Raised Handles

jection to the continued stooping position necessary in the use of the strike board, says *Concrete Highway Magazine*. Handles were made of ½" round iron, bent as shown in the accompanying diagram, and fitted with hand grips consisting of short lengths of rubber hose slipped on to the handle framing. The handles were then bolted to the strike board at each end, making the labor of "running" the heavy 20′ strike board so much easier that no complaints have been heard and that part of the work has gone forward without a hitch. [*June, 1918, p. 222.*]

## Blueprints for Paving Intersection

A bunch of blueprints can be made from one drawing like the sketch, and then elevations, measurements and names of streets filled in for every intersection in your paving district, as follows: 1, name of cross streets; 2, stake elevation at each end of radius; 3, measurement from hub stake to radius




MAKE UP BLUE PRINTS AND FILL IN WHITE SPACES, HERE SHOWN IN BLACK

stakes; 4, distance of curb from property line; 5, distances from back of curbs across street; 6, for name of street.

The blank space on bottom can be used by engineer for any notation he sees fit to use it for, such as legends, etc.—Charles Thomas, Amarillo, Texas. [*May, 1918, p. 156.*]

## Finishing Concrete Streets with Long Float

In placing a two-course concrete pavement on Eleventh street, Wichita Falls, Tex., a novel method of finishing was employed which gave most excellent results, says the *Concrete Highway Magazine.*

Two 1″ x 6″ boards, each equal in length to one-half the width of the pavement, were spliced so as to make a jointed plank, the length of which was equal to the width of the street. At each end of this was nailed a short piece of 2″ stock so notched that the outer end rested on the curb and the bottom of the float was at the gutter grade. A hole was bored near the lower end of this at an angle of about 30° and wooden handles were inserted. A man at each end then pushed and pulled the float over the pavement, finishing in one operation the whole width of the street, the float being drawn across the surface as many times as was necessary to obtain the required evenness.

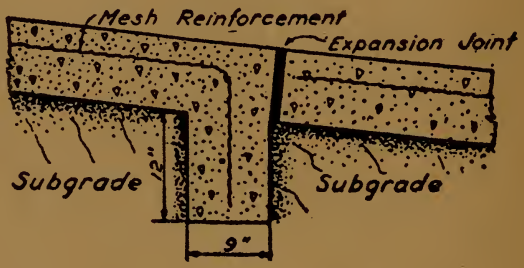
This process eliminated much of the excess water and gave an even surface but not one as gritty as that produced by the belt finish. [*Oct., 1917, p. 110.*]

## Concrete Paving on Grades

Concrete, at one time considered in New York State as unsuitable for grades steeper than 5%, is now being used on grades of 9%. H. Eltinge Breed, first deputy commissioner, New York State Highway Commission, in an article in *American City,* says, "for heavy motor truck traffic, the concrete pavement is desirable on grades of 9%, or possibly 10%." Such grades, however, involve some special considerations which Mr. Breed describes and which are summarized as follows:

"The work should proceed from the bottom of the grade uphill. This will permit screeding without waviness. A reasonably dry mix should be used; not so dry that tamping is necessary; care and a little experi-

menting in the field will give the exact amount of water necessary. Particular care should be taken to place all joints perpendicular to the surface. The joint material should be placed about ½" below the surface, so that the screeding and necessary floating may be continued over the top of the joint, to make the surface smooth. When the cracks come at the joints, the spalling can be taken care of by pouring the tar and sand. The least possible screeding to secure the necessary surface on the concrete should be done and the floating should be minimized.




NON-CREEPER EXPANSION JOINT

"The surface should be broomed. This will, for a time, give the pavement sufficient roughness to hold traffic fairly well. It has been suggested many times that concrete on grades be scored or marked; but as it is only a short space of time before these scorings or markings are worn smooth, the extra cost of the work is not commensurate with the results.

"To overcome a tendency of the concrete slabs to creep down hill, the writer designed a non-creeper joint, which is now being tested in construction work so as to determine its possible advantages. Joints must be absolutely perpendicular to the surface." [*May, 1918, p. 186.*]

## Smoothing Up Concrete Pavements

To eliminate transverse waves in concrete roads so disagreeable to swiftly moving traffic, S. P. Baird, member, A. S. C. E., of Portsmouth, Ohio, says (*Concrete Highway Magazine*) that he has found that a float approximately 10′ long is the best device that can be used. With such a float two men are required, one at each end, on separate bridges, and float from one edge to the center. In reality such a float is nothing more nor less than a longitudinal strikeboard which smooths down all the spots that may be left in the surface by imperfect finishing.

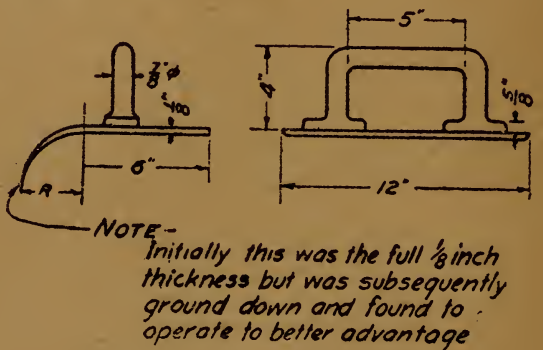
To prevent floating out the expansion joints, he has found it a good practice to nail on the lower edge of the filler a row of water soaked lath. These keep the joints in a vertical position and prevent them from being disturbed when floating. [*Oct., 1917, p. 119.*]

## Preventing Cracks in Concrete Roads

It must be emphasized that great effort should be exerted to protect the concrete during its initial stages of hardening. Do not mix it any wetter than necessary to obtan smooth, yet economical construction. Protect it from sudden decrease in temperature and keep it wet for at least 2 weeks in order to prevent undue shrinkage while the concrete is green. Much attention should be given the sub-base, for, as has been pointed out, the friction at the base causes transverse cracks. This friction may be greatly reduced by proper care in the preparation of the sub-base and in this way the cracks may be widely distributed, if not entirely eliminated. In addition, provide proper drainage to keep the sub-base as dry as possible, so that the effect of frost and the settlement due to moisture may be eliminated. Finally, design the slab as to thickness to carry the loads it is supposed to carry, irrespective of whether the sub-base offers uniform bearing or not. [*Oct., 1917, p. 115.*]

# Edger for Concrete Roads

While serving as Resident Engineer of Concrete Road Construction under the Massachusetts Highway Commission, Earle O. Turner, at the College of Engineering of the Brooklyn Polytechnic Institute, says, in the *Concrete Highway Magazine,* that he had occasion to improvise an edger, being unable to locate one which would meet with his requirement, as on the work under construction it was desired to turn the edge of the pavement over on a 3-in. radius and the only edger available in the local stores was one with a radius of ½″.




Detail of Home Made Edger

A sketch was made, as shown in the accompanying figure, and the local blacksmith turned out a tool which was entirely acceptable, with one objection, that he did not bevel off the edge, but left the full thickness of metal which caused the stone to be picked up as the edger ran along the inside of the form. When this fault was corrected, it was found that a clean edge of a 3-in. circular curve was easily finished and gave the road a solid and pleasing appearance.

A radius as great as 3″ is not often used on concrete road work, 1½″ being the amount of curvature usually called for. The edger could be made up, however, for any desired radius. [*July, 1917, p. 7.*]

## Saving Men on a Paving Job

We herewith submit a labor-saving device on concrete paving. We operate Koehring and Chicago mixers. We operate both swing boom and revolving chute distributors. We conceived the idea of constructing four specially built carts for each machine, to carry the mineral aggregate from storage piles to mixer. The carts are low built and narrow-gauge, in order to handle them conveniently at the hoist. They are equipped with dump body, containing 9 cu. ft., separated into two compartments, rear compartment being 3 cu. ft., with a swinging tail gate, the second compartment being 6 cu. ft., with a swinging gate between the two compartments. Beds are built long and narrow so as to dump quickly and to allow the body to clear of its load before the cart goes off the hoist pan.

The dump and the tail gate are operated by the driver in the cart. We load our gravel with a Keystone shovel and on a narrow street or in a close place have two men to shovel 3 cu. ft. of sand in the rear of the cart. As the cart passes back toward the mixer, a bag of cement is thrown on, making one complete batch mix, proportions 1:3:6 (pavement base). The cart, loaded with material, is backed on to the hoist pan and the load tripped by the driver.

On a wide street of 36′ or more, we use a portable bin and put both sand and gravel into the bin with the steam shovel, and then draw it from the portable bin into the carts. This only takes an instant.

In operating either way, four mules, four lead boys, two shovelers, one operator for steam shovel, one tripper and one clean-up man take the place of 14 men as formerly employed. At the present prevailing wages, the cost of our former way of operat-

ing is much greater than with the present equipment used.

We find also that we can lay more yardage per day with this means of handling our material than we could with so many laborers. There is now no confusion at the hoist pan, as formerly, when three wheelbarrow men were trying to get on the hoisting pan, while another wheeling gang were on the way.

The carts were built by Frank H. Post & Co., Knoxville, and this plan of handling material was designed and worked out by George J. Oehler, general superintendent of the Murray Construction Co., of Knoxville.—Fred L. Conner, Murray Constr. Co., Knoxville, Tenn. [*Sept., 1918, p. 92.*]

## Bulk Cement in Road Work

Bulk cement was used in road construction work in Ohio by Williams & Little Co., contractors, Cleveland. It was first used by this company last year (1915) in the construction of 8 miles of concrete road 16′ wide, 7½″ thick at the center. Tight wagon boxes holding 65 cu. ft. were used and the wagon was set so that the top of the box was level with the car floor, an extra wagon being employed so as not to hold a team. In opening a car of cement a coal chute was used to the wagon, hanging the upper end on planking across the door and shoveling to it. Then a platform was used from car to wagon. With a two-wheeled cart of special make, low hung and with open end body, a man drove the body into the cement and finished filling with a long-handled, winged hoe, especially made. This was wheeled out and dumped into the wagon. By these methods a wagon was loaded in from 12 minutes to 15 minutes.

Especially made boxes were used to receive the cement on the work. These boxes are 2′ 6″ x 2′ x 12″, holding an equivalent of 60 sacks. Two men could carry these ahead when light or chain and drag

behind wagon. A coal chute was again used in loading cement to the boxes from the wagons. Boxes were so placed and filled as to carry the work forward a given distance, always the same. The mixer is charged from wheelbarrows built to hold enough cement for one batch when level full.

The Williams & Little Co. is equipping to handle bulk cement still more cheaply or more cheaply than sack cement. So far the report is that there is absolutely no waste in its use, that it is bought more cheaply, that there is no loss or care of sacks, no money invested in sacks, no loss in transit or on work in case of storm, all boxes being equipped with a ridge pole and tarpaulin. Cost figures on sack cement and on bulk cement used as described show a saving of 8 cents per barrel in the use of the bulk material. [*July, 1916, p. 35.*]

## Roller and Belt Road Finish

Specifications for the finish of concrete road surfaces with roller and belt, suggested by the Portland Cement Assn., in the *Concrete Highway Magazine,* are as follows:

As soon as possible after the concrete has been struck off, it shall be rolled with an approved metal roller, having a smooth, even surface, approximately 6′ long, not less than 8″, nor more than 12″ in diameter, and weighing not more than 100 lbs. On pavements less than 20″ wide, the roller may be operated with a handle, which shall be at least 2′ longer than the width of the pavement, and all rolling shall be done from one side of the slab. On pavements 20′ and more in width, the roller shall be provided with two bails to which ropes shall be attached, and the roller pulled across the pavement. The roller shall be operated at such an angle with the center line of the pavement that it advances along the pavement about two feet for each time across. The roller shall pass from one edge of the pavement to the other, care being taken not to run the roller over the side forms so that earth or other foreign material will adhere to it. After the roller has covered a given area in the manner described, the same area shall be similarly covered by the roller

for not less than three times at intervals of 15 to 40 minutes, and as many times additional as may be necessary to remove excess water.

After the rolling has been completed the pavement shall be finished by two applications of a belt made of canvas or rubber belting, not less than 6″ wide and not less than 2′ longer than the width of the pavement. The belt shall be applied with a combined cross-wise and longitudinal motion. For the first application vigorous strokes at least 12″ long shall be used, and the longitudinal movement of the belt along the pavement shall be very slight. The second application of the belt shall be immediately after the water glaze or sheen disappears, and the stroke of the belt shall be not more than 4″, and the longitudinal movement shall be much greater than for the first belting.

[*May, 1918, p. 186.*]

## Filling Cracks in Floors

Too much trowelling will usually cause hair cracks and in the case of floors, dusting. Fine cracks in the cement can be filled by wetting the concrete and dusting on dry cement. Water will draw the cement into the cracks. This is a better method than pouring a paste of cement and water into the cracks. [*Jan., 1917, p. 8.*]

## Patching Concrete Floors Quickly

One of the principal objections often raised against the use of concrete finished floors is the difficulty and cost of successfully repairing places that have become worn or damaged. For best results it is usually considered necessary to cut down the worn place at least 1½″ into the unbroken concrete, undercut the edges, clean out the dust and loose particles thoroughly, wash with a thin cement grout, fill in with a paste grout and finally float to a level surface a mortar of cement and crushed stone or gravel. The patch must then be kept moist for at least 1 week or 10 days, keeping all traffic off in the meantime.

W. P. Anderson, President, Ferro-Concrete Const. Co., Cincinnati, states that his company often uses

a method of patching concrete floors which is much cheaper and requires far less time than the method commonly used. This method requires the use of a mastic material made from a mixture of asbestos fiber and rubber gum. This mixture is applied with a trowel after thoroughly cleaning the damaged surface. Very little cutting of the old concrete is necessary, other than to break off loose particles. The gum can be worked to a feather-edge so that it will readily join with the undamaged concrete surface and eliminate the undercutting required with the old style of patch.

A patch of this sort can be opened to foot traffic within a few hours and to heavy traffic within a day or so. It is thus possible to repair a much used portion of a mill or factory floor almost overnight. The cost varies with the size of the patch, but will amount to from 16 cents to 18 cents per square foot. [*Sept., 1916, p. 96.*]

## New Top Finish on a Poor Floor

A large new store was finished last fall, 6 stories, 2 basements, 200′ x 200′ or so. Floor topping poured on like soup, no windows in, rapid drying out, no signs of markings or expansion joints, nothing at all. Result, topping cracked like mud put on a brick wall, not a space that a hat covers was whole. Besides, so rotten that the janitors swept the sand out of the floors. Being so rotten, the little cracks broke out and in places fully ¼″ of the finish was gone. It was rough, never saw anything like it. This is what I did. Took a very light rubbing machine and even that little thing would have buried itself on soft spots. I was obliged to rub dry because, wet, the carborundum stones cut faster and tore everything to pieces. When rubbed just superficially, as it was impossible to rub smooth, I took the vacuum hose. This cleaned out all the cracks and left the whole thing rougher than

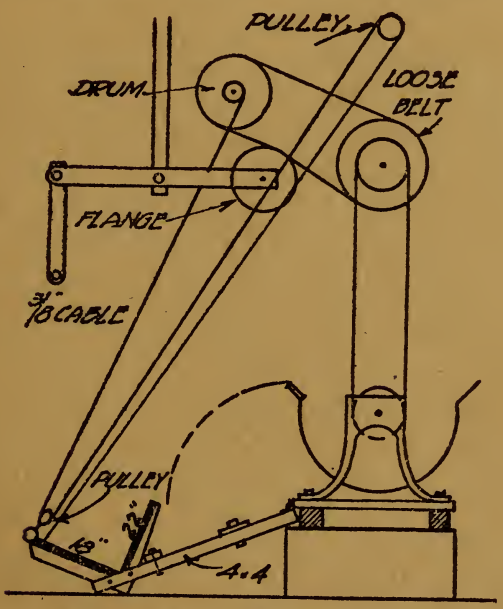
ever. Then I hardened it with Lapidolith. The next day went over with wire brush to remove all loose particles, vacuum cleaned, then soaked for hours with water and flooded with neat cement grout. The vacuum had cleaned every pin hole and crack so well that they ran full of cement. The next night another dose of Lapidolith, next night same story. Wetted them all night for several days and the old floor and filling got like flint. Then to remove that excess of cement I put on the machine a sand paper buffer and the floors shine. They are so hard that steel will not touch them. This scheme is just like what is done in the manufacture of terrazzo tile to fill the pin holes. (We worked at night and never interfered with the store's business.) When the grout is worked in, it is struck off, so that the excess that I took off with sand paper was very thin, a mere film. The trick is to get all the holes even full and the cement so that it will not shrink and leave depressions afterward. I fixed part of one floor about 7,000 sq. ft. All the rest of the floors are carpeted but I suppose that all through the building it is the same story. This naturally works only where the topping sticks to the base.—Robert B. Lammens, Los Angeles, Cal. [*May, 1918, p. 156.*]

# For Concrete Products Manufacturers

## Mixer Loader Saves Time in Products Plant

We have a Blystone mixer, which is fed from the sand bin in the rear. Shoveling the sand direct into the mixer and then watching it mix was taking too much unnecessary time, so I built a loader.

I first raised the mixer 12″ above the floor, so as to make more room to dump, then hinged two 2 x 4's




HOME MADE MIXER LOADER

to the sill of the mixer, using a common screw and cap hinge. The 2 x 4 should be about 5½′ long, or just long enough for the box to clear the mixer drum. The box is made of wood and lined with sheet iron, and should be well made and securely braced. It should be just the size to hold a batch. As I had no clutch and the machine shops wanted $30 for a clutch and drum, I made one by placing a pulley on the line

shaft. Any size will do, and another pulley and a drum on a counter shaft. This shaft was placed a little above the line shaft and about 1′ in rear of mixer. The drum was made by bolting two 2 x 6's to the counter shaft and rounding it off. Then I put a 3″ leather belt on the two pulleys. This belt should be loose, so that the line shaft will revolve without moving the counter shaft. Now, by attaching another pulley to a movable lever, so that by pulling down on the level the pulley tightens the belt—up she goes. I use ⅜″ wire cable and fasten one end to the drum and pass through a pulley fastened to the box half way between the center and one end, and then through a pulley located somewhere above the center of the mixer, and fasten to the other end of box. The accompanying sketch will show how anyone can make a loader of this kind. I have used this loader for three years without any expense except the renewal of the cable.—J. W. Gilbert, Mgr. Concrete Products Co., Columbus, Ohio. [*May, 1918, p. 155.*]

## Home-made Mixer Loader

I have my Blystone mixer equipped with a home-made loader. This has increased the capacity of the mixer 100% and saves one man's time. Before I attached the loader I worked two men at the mixer, but this is by much longer mixing than that ordinarily given concrete work. Extra mixing takes the place of considerable water, and excess water is a detriment to the work, decreasing the density of the finished concrete. A small percentage of hydrated lime in your mixture would probably be of considerable assistance in getting a smooth flowing consistency, and one which will settle into place without air bubbles.—E. E. Elkins, Arcadia, Fla. [*Mar., 1918, p. 100.*]

## Cutting Molds Direct from Plaster

In getting out plaster molds for two consols a New England stone manufacturer reversed the usual order of procedure and saved considerable on the job.

Instead of modeling the work in clay and making plaster molds, he hired two wood carvers who cut the molds direct in plaster, working out the design in intaglio rather than relief. One entire operation was thus eliminated and for $50, work was done that by the methods usually employed would have cost three times that amount.

It occasionally happens that the services of wood carvers can be had when modelers are not available. A large products factory in the middle west used a former wood carver to produce plaster models instead of clay models. Instead of the modeler's method of building up his design, clay on clay, the carver first casts a block of plaster, marks out his design in the rough and produces his result like the stone carver by cutting away. [*June, 1918, p. 207.*]

## Consistency for Plaster Molds

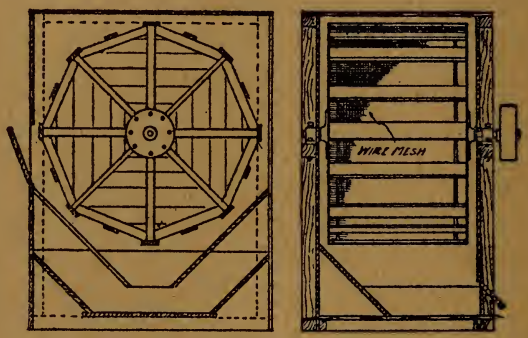
Concrete of a wetter consistency can be used safely in sand molds in which much of the excess water is taken up, than in more nearly impervious molds such as plaster, which have been well finished with shellac.

Manufacturers of concrete in sand molds use plaster molds for such pieces as can be more economically made in plaster, but changing the mix in order to make a few plaster mold casts causes delay and inconvenience not always justified. One manufacturer of concrete stone finds it more satisfactory to pour his plaster molds from the same batches used in the sand molds and afterwards fill the pin holes in the plaster mold casts. The necessary fluid quality of the mix can be obtained with less water by long mixing and results in a minimum of separation of materials. [*June, 1918, p. 217.*]

## A Bag Cleaner Saves Cement

Wherever bagged cement is used in quantity it is well to consider the installation of bag cleaning equipment.

The records of the Omaha Concrete Stone Co. show that about a half pound of cement can be recovered from each sack cleaned. On the basis of present cement prices, the direct saving from 1,000 sacks is approximately $3.00. To this is added the freight that would be paid on the recovered cement when returning the bags.




A Cement Sack Cleaner Used by the Omaha Concrete Stone Co.

Indirectly the cleaner greatly reduces the disagreeable feature of shaking and bundling bags since they are free from dust.

The cleaner consists of an eight sided drum mounted on a shaft and enclosed in a tight casing. The drum is 3′ 6″ wide and 4′ 9″ in diameter, cleans 50 sacks at a time and runs 12 r. p. m.

The construction is indicated by the accompanying illustration and can of course be varied to fit the maker's ideas and material most readily at hand. Bulk cement, however, gets rid of the sacks altogether. [*May, 1918, p. 155.*]

## Plaster Mold Pieces in Sand Molds

It frequently happens that concrete stone casts which can be readily made in sand molds, except for some small undercut detail, can still be handled in sand by first making a glue mold of just that one detail. From the glue mold a glue model is made and from the glue model a sufficient number of plaster molds to take care of each duplication of the pattern. The plaster mold is assembled with the pattern in the sand, the pattern removed and the plaster detail mold left in place. When the hardened concrete cast is taken out of the sand the plaster is chipped away from the undercut detail.

This method would usually be adopted only when a number of like units were to be made. Should an intricate detail be a feature of a pattern to be reproduced once or twice only, it would probably be more economical merely to rough out the detail on the pattern and let the undercut be put in by the stone cutters, when the work is finished. It is in minimizing the stone cutting that the high class concrete stone is made to undersell natural stone, so when units are several times duplicated it is better to go to some pains with the pattern to save on the final cutting. [*June, 1918, p. 210.*]

## Sulphur Molds

In searching for a material to make molds for ornamental concrete work in the Engineering Department, University of Nevada, the idea occurred to someone to use sulphur, which is readily obtainable in large quantities and at small expense to the University of Nevada. The sulphur molds give an exceptionally smooth surface and in general the results are much better than obtainable with plaster molds. The sulphur contracts slightly in cooling. [*Feb., 1917, p. 70.*]

## Prepare Their Own Facing Aggregates

The Maul Co., manufacturers of concrete stone, Detroit, prepares a large percentage of its own facing materials, using a small Wheeling crusher and a Universal pulverizer, each with a capacity of 4 tons per day. The company buys Vermont granite at less than $4.00 a ton in small spalls, most of them of a size which can be fed direct to the crusher, where the first reduction is made. The material then goes to the pulverizer, to get a finer material suitable for facing mixtures. The company's object in preparing its own facing materials is not so much to get a cheaper product as to get a product with individuality, since the same kind of stone is not used by other concrete stone manufacturers.

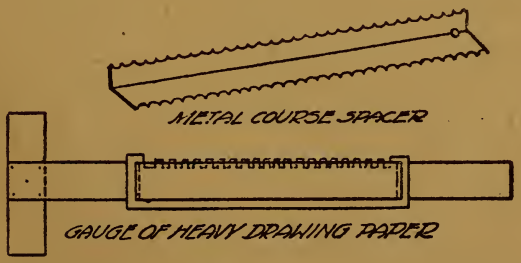
There is a thought here for concrete stone manufacturers which is particularly worth while, and which a good many might well take advantage of, even more conveniently than the Maul company, as local materials of some kind or other suitable for facing are frequently available. It is just a question of preparing them for use. [Mar., 1918, p. 89.]

## A Faced Product in Sand Molds

A special sand cast stone product for which one manufacturer has considerable call is made by lining the sand mold in a thin layer next to the pattern with a white crystaline rock sand, of coarse texture. A certain amount of the pattern sand always clings to a stone cast in sand anyway and in the special product referred to, this fact is taken advantage of to produce a stone with an outer coating that appears not unlike loaf sugar. Such stone is only lightly rubbed down in finishing. This practically amounts to a faced product, which is unusual in sand cast work. [*May, 1918, p. 169.*]

## Time-Saver for Block Manufacturer's Draftsman

We make a working drawing of the different elevations of every job, which means a lot of time (and patience) if you have to use a compass to space the horizontal joints and more time and a lot more patience if you have to mark in all the end joints individually. Instead of using a compass to space off the heights of the courses and the lengths of the blocks, I procured a piece of 20 gauge iron and bent it into the shape of an angle iron ¾" x ¾" and about 8" long. On one side of this I formed teeth with a round file, so that the points were the exact distance apart that the courses of blocks should show on the plan. Of course, this should allow for mortar joint as well, which in our case represented 8⅛" in all. On the other edge of this angle I made the points to correspond to one-half the length of a block laid in the wall. When I had the teeth carefully made I side-dressed the points so that when they were pressed on




TIME SAVING TOOLS FOR A DRAFTSMAN

the paper they left a mark like an awl point rather than a chisel. To use this spacer simply place the points of the teeth on the drawing paper, either along the horizontal or vertical line, as the cases may be, and press the points into the paper, which leaves a row of dots in the proper places for the base lines

or the end joints. If the tool is carefully made, a person can scale the wall openings from the drawings as accurately as to figure them.

The other tool is for marking in the end joints after the horizontal lines are all drawn. It is made out of a piece of extra heavy drawing paper about 1¼″ wider than the blade of the tee square, and 12″ or 13″ long. It has a slot in each end about ¼″ wide for the square to slip through, and along one edge there is a row of notches, each one the width that the horizontal joints are apart on the drawing. When this is slipped on the tee square the notches should show partly by the edge. To use this, use the tee square from the bottom of the drawing board and adjust the gauge to suit the horizontal lines and draw the pencil along the square as if the gauge was not there. The result will be that there will be a row of dashes representing the end joints of every other course of blocks. When the elevation is gone over once, shift the gauge on the tee square the width of one space and go over it again to get the end joints of the other courses. By using these tools we find that after a little practice we can save 50% of the time originally used in this work.

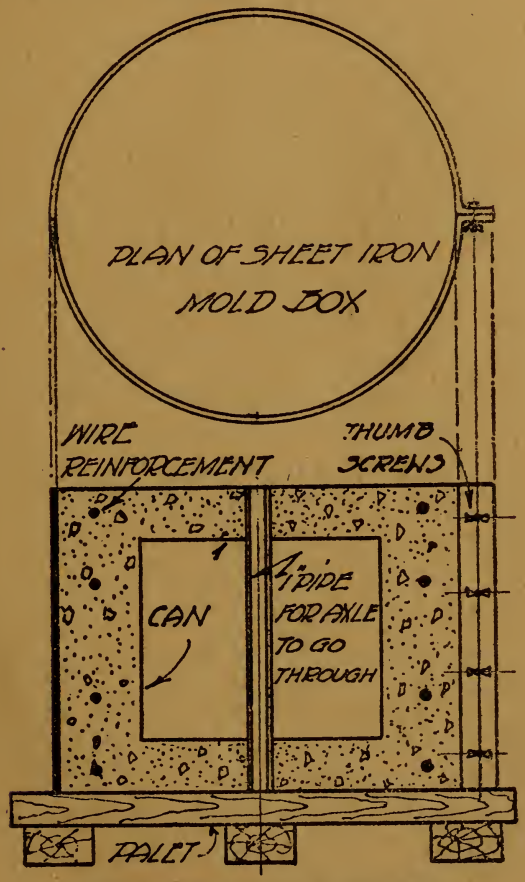
We use a ⅜″ scale on our elevations, as a ¼″ is a little too fine and is harder to follow on the job, while ½″ is too bulky.—Harry Boyd, Mgr. Boyd Bros., Osgood, Ont. [*June, 1918, p. 208.*]

## Removing Lumps from Casting Sand

The casting sand used in sand molds in concrete stone manufacture becomes useless through the accumulation of little lumps of concrete, splinters and debris generally. A revolving screen, power driven, that may be moved throughout the length of the shop, is used to good advantage to put the casting sand back into condition for use. [*June, 1918, p. 207.*]

## Lightening a Lawn Roller

We are now making up our stock of concrete lawn rollers for spring delivery. The accompanying illustration shows a kink we use in making them light in weight and yet have a large diameter, which makes the roller easy to handle.




CROSS SECTION THROUGH
LAWN ROLLER.

### How the Roller is Made

The roller shown is 24" in diameter and 18" wide, and weighs about 300 lbs. From the local garages we get empty grease and oil cans which usually go

to the dump. A 5-gal. Polarine can is just the thing for this size roller. This answers as a core and lightens the roller and saves concrete.—Carl W. Baumgardner, Baumgardner Concrete Products Co., Tiffin, Ohio. [*June, 1918, p. 208.*]

## A Container for Mixed Concrete

A concrete stone manufacturer, pressed in extra busy times because of lack of capacity in his agitator or auxiliary mixer, from which the concrete is deposited in sand molds, uses a hopper-shaped receptacle of sheet metal with spout and spigot, in which a big batch can be quickly deposited and later drawn off in pails, agitated with a paddle and deposited by hand for small casts. [*June, 1918, p. 207.*]

## A New Idea in Corn Cribs

Corn cribs, factory made, easily erected, that afford ventilation and exclude vermin, are being built of concrete.

One such corn crib is owned by A. W. Stewart, Lacey, Iowa, and was built by the Caldwell Silo Co., which has applied for patents on some of the construction details.

The units are modified silo staves, 10″ x 30″ x 2½″. Each stave has two 4½″ x 9″ openings, guarded by four ¼″ bars, to exclude vermin. The crib sets on a concrete foundation, through which, just above the ground line, are 8″ concrete drain tile with screened openings to the outside. These tile connect with the openings in a layer of concrete blocks laid on their side. Over these blocks is a layer of smooth troweled concrete. At the center of the crib is a chimney connected with the ducts in the floor. The chimney shell is built of blocks, some of which are laid on their side so as to ventilate the entire body of corn thoroughly. This crib successfully carried 2,000 bu. of corn last winter. [*June, 1918, p. 222.*]

## Concrete Stone Patches

Patching and piecing concrete stone successfully provide a way out of difficulties when breakage occurs, and at once suggest a means for economy—in special cases and not as general practice—in making intricate pieces of cast stone in separate parts which are subsequently joined.

An Eastern concrete stone manufacturer casting in sand molds, has found patches very successful. Supposing a piece is broken away from a cast whose recasting would mean considerable loss, all that is necessary is a mixture of materials identical with that used in the original cast. The broken surface is cleaned thoroughly, all loose particles brushed out and the break well wetted. To the dry mix water is then added to obtain a plastic consistency. The patch is applied and roughly modeled to shape, great care being taken to keep it wet by applying wet cloths, until thoroughly hard. The stone men who finish the work then tool the patch to proper shape. If this work is well done there is no breakage, the patch apparently being as strong as any part of the stone.

Following this idea of successful patches, the manufacturer referred to had some intricate gothic finials to cast. The pattern and mold problem could be greatly simplified if the stones were made in two pieces, with one flat side each—the two pieces, to be joined on the flat sides, forming a center plane of the finished stone. The pieces were made in halves and slightly hollowed in the center, a hollow on each flat side as big as one's fist, the stone having a cross section of about 12″. Into one hollow an iron hook was set, the ends embedded in the concrete at the bottom of the hollow. When hard enough to handle the surfaces to be joined were cleaned, wetted, grouted with a tinted mix like the stone; the

hollows filled with a like mix and the joint made, the hook embedded on one side reaching into the opposite hollow and reinforcing the joint. The knife edge of the joint was tooled, and "nobody could tell the difference." Another manufacturer turned out some elaborately modeled balustrade sections in the same way.

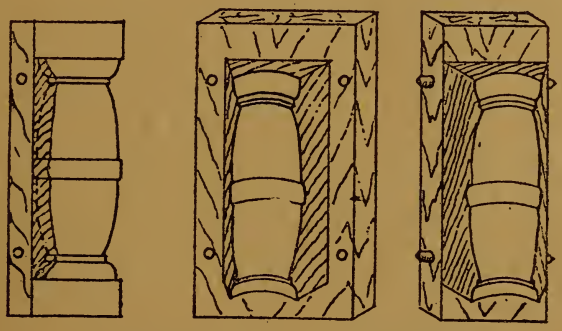
Patches are apt to be unsuccessful unless the surface so patched has subsequent treatment of a vigorous sort. In making a piece of concrete pottery, the writer had to patch the legs of a small urn. Tile for inlays had been glued into the mold. On releasing the urn from the mold, the concrete below the tile inlays on the three legs was soft—probably due to excess glue, which the plastic concrete had absorbed. The legs were cut away where they were soft, the remaining hard surface brushed out and soaked with water and patches modeled in place, the urn (24 hours old), standing on a small metal pallet. The mix was one part white cement (10% hydrated lime added) and 1 part each of fine white marble and buff stone, with 5% of yellow ochre. Some of the dry mixture had been saved before water was added for the original cast, and this was used for patches and for filling small imperfections. When hard, the surface was vigorously rubbed with fine carborundum and given an acid bath further to expose the aggregate. The patches cannot be detected from the original cast in the finished job. —Editor. [April, 1918, p. 132.]

## Reinforced Concrete "Bankers"

Rigidity of bankers is an advantage and reinforced concrete was used at the factory of the Hydro-Stone Products Co., Chicago. In rebuilding an improvement is suggested by J. K. Harridge, who would have an iron rail or plate in the top to facilitate sliding the pallets. [*June, 1918, p. 207.*]

## Plaster Mold of Baluster

The baluster mold shown in the sketch is a good, rugged mold to use where the character of the work is such that the ordinary standard iron mold will not do. The wood backs are made to form a box, the inside measurements of which are the same as the square section of the baluster. These are properly doweled. Dowels are the best device to use to insure the parts of the mold membering up true. From a full size detail the plaster shop makes a model out of plaster by turning with a sheet metal template. The mold is cast in plaster around this model in the following manner.



PLASTER MOLD OF BALUSTER

One side board is placed flat upon the bench and the baluster model is placed upon it in the correct position. Enough plaster is then worked under and around it to form about one-fourth of the mold. When this plaster has set, remove model, scrape the sides smooth and grease (with mixture of steric acid and kerosene) to form a parting as the next quarter section is cast up to it. Replace side board and model in original position and put the two end boards on edge in place. Cast about one-quarter of the mold on each of them and finish as before and reassemble. Make a 1″ hole through the second side board or last quarter of the

box, place it in position on model and mold, and through the hole pour liquid plaster to form the last quarter of the plaster mold. This section will be formed entirely by the model and adjacent end boards.

Take the mold apart, paint it, and give the working surface two coats of thin shellac.

To insure the plaster sticking to the wood, drive nails into it, letting the heads stick out. At any point where the plaster would work thin, the wood should be chiseled out.

When used this mold should be rammed from each end. Use a wood tamp and do not hit the plaster. Take the mold off at once and smooth the seams with a stick.

The plaster man must use his judgment and apply the method that best fits the character of the work to be done. In the baluster mold the first three sides would be made with semi-set, or stiff plaster; the last one would, however, be made with thin plaster.

Probably 98% of all plaster work was done in slightly stiff plaster, which is worked into position with the bare hands, without the use of stops or gates of any sort. This is the practice of the expert plaster man.

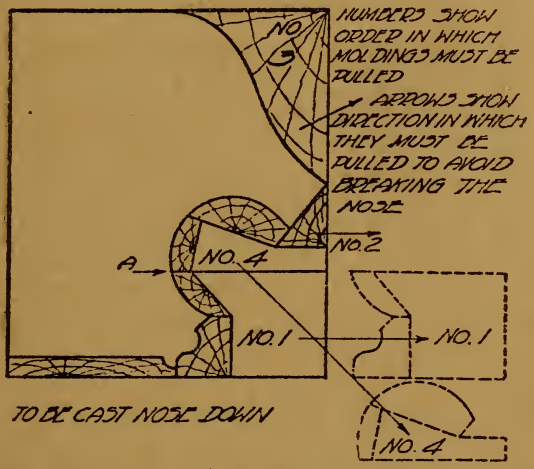
Plaster should be mixed to the consistency of cream and then not disturbed, as a body, until dipped out to use. To stir it continually hastens the setting a great deal.—Paul H. Beatty, George Rackle & Sons Co., Cleveland. [*June, 1918, p. 210.*]

## Making Plaster Molds Last Longer

A stone manufacturer reports that common salt put in plaster has a tendency to give a harder, more resistant surface on molds. Then if several coats of shellac are used the life of a plaster mold is prolonged. [*May, 1918, p. 169.*]

# Making Mold For Stone With Undercut Molding

In the sketch is presented the solution of a problem of undercutting a form of molding usually encountered in Gothic work. To make it possible to cast this type, moldings cannot be split at their natural intersections, but must be split at some point (A) in the molding. By pulling No. 1 first, we get enough clearance so that No. 4 may be pulled in the direction shown without breaking the nose off the fresh stone.




MAKING MOLD FOR STONE WITH UNDERCUT MOLDING

This stone, as well as all stones of this type, up to 3′ in depth, should be cast nose down. This method saves banker space, and all of the faced surfaces are formed by the mold, eliminating the necessity of hand work with a trowel, which is costly and always causes checking.

If the stone is too deep to cast in this way, cast it as it will be laid in the wall and trowel the wash on. Then cover the faced portion with white sand before putting the bed sand on to turn over.—Paul H. Beatty, George Rackle & Sons Co., Cleveland. [*June, 1918, p. 209.*]

## Advertising Concrete Block on the Job

Lee Mills who makes concrete block of the double Anchor type in Muskegon, Mich., advertises his pro-


Sign Used to Advertise Block On the Job

duct on the job with signs like that in the sketch. [*Apr., 1917, p. 149.*]

## Two Kinks for Products Makers

In making a plaster mold I ran short of plaster of paris. Not being able to get it on time I substituted portland cement, using half of each, and was surprised at the strong, clean mold I obtained. I oiled it well with cylinder oil, filled it with a running mixture of sand and cement, let it stand for 36 hrs., and it came out nice and clean and the mold just as good as ever.

In making burial vaults I always had trouble in getting the wire netting straight and keeping it that way until the mold was filled. By using two or three pieces of ¼" twisted steel rods, according to width, and wiring to netting (am using all No. 9 farm fencing) I can keep it straight, at the same time add to the strength.—Nicholas Melcher. [*July, 1917, p. 27.*]

## Concrete Water Meter Boxes

When it was decided to install water meters in his town, William Acheson, Superior, Neb., knew there would have to be a place provided in which to set them.

He designed a cylindrical concrete shell provided with attachments for covers and secured the approval of the designs by the local authorities.

He then made up a stock of boxes and waited for the demand. It came and several hundred boxes were sold and installed at a neat profit. [*June, 1918, p. 206.*]

## Finishing Stone—Tools Used

That the manufacture of a high quality concrete stone in the finishes to which many architects, particularly in the East, have been educated, is essentially a stone man's job, is clearly pointed out by one of the successful manufacturers.

Instead of quarrying the stone in usable units, the concrete man takes what, from the natural stone man's standpoint, is quarry waste. He crushes it, grades it, and produces as the first step a high quality concrete in convenient units. At that stage in his operations he has progressed only a little farther than the natural stone man who has done the preliminary sawing of the quarried stone. From there on the concrete stone manufacturer's work is the stone man's work. His tools and his methods are almost identical. An inventory of the finishing methods in a concrete stone plant reveals that he may use saws, planers, rubbing machinery, pneumatic or electric cutting tools, rasps, scrapers, sandpaper, picks—all these and more—in getting the finished outline and the desired surface.

To do this, however, he has in his favor certain economies open to his use which the natural stone man is denied. In casting his concrete units he can

eliminate a great deal of waste, a great deal of cutting and tooling by casting to a close approximation of the finished piece.

It is interesting that in a factory employing 150 men making concrete stone, most of it is in sand molds, but many special pieces in plaster and glue, there were 30 men in the special mold and pattern shop and 35 men engaged in the final dressing of the casts. [Oct., 1918, p. 121.]

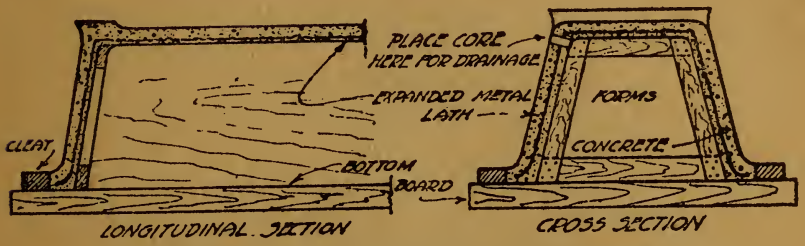
## Rough Textured Block Made in "Tamp" Machine

Since so much interest has developed in rough textured concrete block, as a means to livelier and more interesting surfaces, it has frequently been contended that such surfaces cannot be obtained on block made in dry tamp equipment. On the other hand it has also been contended that the difficulties are chiefly in the imagination of some block makers who have been wedded to the slick looking surfaces obtained with fine sand facings—surfaces which seldom have the variety and attractiveness which coarser facing materials would give. Block with rough, interesting surface were made for the Universal Portland Cement Co.'s new sack building at Buffington, Ind., on two different types of tamp equipment—a Hobbs machine under a Kramer automatic tamper and in an Ideal machine under hand tamps.

The fact was established that coarse, lean facings, with no sand, can be handled in the commonest types of equipment. It is merely a matter for the taste and resourcefulness of individual manufacturers to develop logically in selected aggregates for facings—coarse, vigorous surfaces. The particular block in question were neither brushed nor sprayed. The results are comparable to those obtained by Chicago's South Park Commissioners on a great deal of attractive work cast in place. [*Dec., 1917, p. 179.*]

## A Kink in Flower Box Construction

I have used the method herewith shown to make a concrete flower box. Over a wooden form, a sheet of expanded metal was placed, then a coat of about ¾″




Detail of Flower Box Construction

of concrete. After this had set, a stucco coat was applied with pleasing results. I would use the same method again.—A. E. Holmes, Sac City, Iowa. [*Nov., 1918, p. 169.*]

## Handling Cement, Aggregate, and Mixed Concrete in Products Plant

In the plant erected at Bethlehem, Pa., by Hamilton & Cavanaugh, for the manufacture of McIntyre structural tile for the United States Housing Corporation the hand labor connected with raw materials has been reduced to very near the minimum. Aggregate and cement are handled in bins at ground level. The cement is raised in bulk from the bin by a bucket elevator with 4″ buckets every 2′ on a 6″ wide canvas belt 84′ long. The sand is picked up from the bin by 8″ buckets every 2′ on an 8″ belt 84′ long. These materials are conveyed through housing, and raised to the cupola of the plant, where they feed into hoppers, that for cement holding approximately one ton and aggregate approximately two tons. The future installation of elevators to convey the material from the

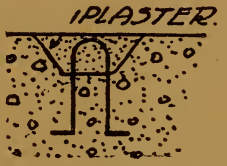
elevator boot into the bin will be driven by a 10 h. p. motor. A 10 h. p. motor drives the elevators which convey cement and aggregate for one plant unit (consisting of 4 tile machines) the automatic meauring device and 11 cu. ft. Blystone mixer. One man operates each of the proportioning and mixer units. Each of the two hoppers, one for cement and one for aggregate, has a false bottom consisting of a mere frame of angle irons, which constitutes the measuring device. These frames are so set as to drag from the bottom of the cement hopper a quarter as much cement as the other frame draws of aggregate from the other hopper. A movement of a clutch in the hand of the mixer operator starts the proportioning device, and he counts off so many strokes to a batch. This is fed direct through a short chute into the top of the mixer. Theoretically, each batch of material is mixed for 1½ minutes. The mixed concrete dumps into a four-way chute system, which conveys it to the hoppers above the tile machines. [*Jan., 1919, p. 22.*]

## Spigot and Pipe from Agitator

Placing concrete in sand molds must be done carefully. In spite of a very smooth flowing mixture, obtained by careful grading, proportioning and long mixing with just the right amount of water, the stream of concrete from the agitator, or auxiliary mixer, must not strike with full force against the sand mold. Straight spouts are sometimes used and a shovel or small board held by the workman to break the flow inside the mold. The Onondaga Litholite Co., using an agitator with a large spigot, has an L-shaped spout about 3″ in diameter and with a flare at the top, with hooks that fasten on at the spigot. [*June, 1918, p. 206.*]

## Providing Setting Hooks in Concrete Stone

A great deal of trim stone must have setting hooks or loops cast in place, so the units may be handled on the job. The usual practice is to make a "hairpin" of light rods with the ends bent over at right angles, these ends being embedded in the stone and the loop




Embedding Loop for Handling Concrete Stone

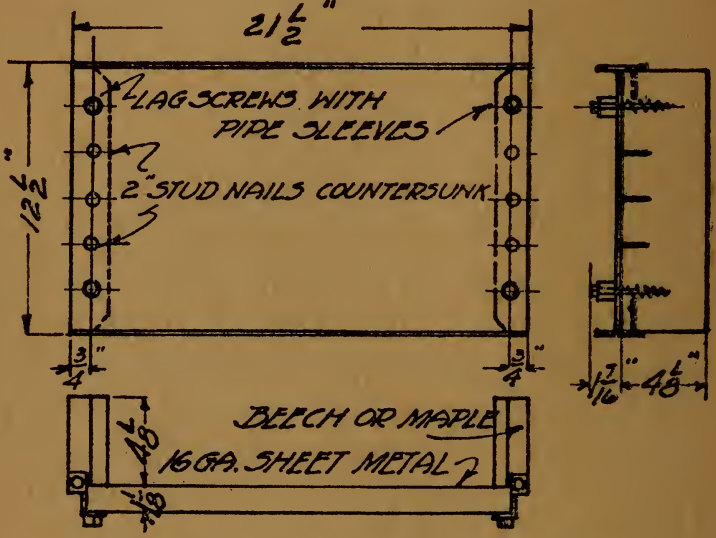
projecting. The bent over loops, flattened in shipping, are a nuisance, and one manufacturer casts a lump of plaster over the loop end, the loop coming flush with the surface of the stone and made accessible later by gouging out the plaster. [*May, 1918, p. 169.*]

## Wood Edges on Sand Molds

In casting in sand molds the top edges of casts are apt to be ragged. It is obvious that when the sand is under so little pressure and where exposed to accidental breakage the top edge is hard to keep true. As the top surface of sand cast stone is usually troweled some minutes after pouring, there is further difficulty in keeping the edges true. Usually the pattern is so made as to keep exposed surfaces of the finished stone down in the sand bed. This is not always possible. It is therefore the practice with some manufacturers to send from the pattern shop to the casting room along with pattern, casting ticket, and sometimes template guide for the finisher, such wood strips ½" thick as are necessary to embed in the sand at top edges where an edge must be kept true for a finished surface. Troweling is therefore done up to the wood strip rather than to a fragile edge of sand. [*June, 1918, p. 206.*]

## Pallets of Wood and Steel

Wood pallets having deteriorated rapidly and been reduced in comparatively short time to a soft, punky consistency, the Delta Brick & Tile Co., Detroit, designed a pressed steel pallet with sides of hard wood, as shown in accompanying details. The steel and the wood parts are being assembled at the Delta factory,




Details of Wood and Steel Pallets

the net cost on the first lot being about 50 cts. each. A second lot will undoubtedly reduce this figure by 20%. These new pallets are now being treated in a steam heated bath of kerosene and paraffin oil. These pallets are for use in making Eberling Structural Tile on a pressure machine. [*June, 1916, p. 270.*]

## Shelf for Cement Bag on Mixer

One of our nearby competitors came into our plant just a short time ago and he noted an arrangement which we have used from the time we first bought a Blystone mixer and which we thought little of until he called our attention to its helpfulness in

handling cement, as we are compelled to handle it in our small plant. We have a one-bag mixer. First we shovel in one-half of the amount of sand for a batch, then add a bag of cement, the mixer working the meantime by power; then add the rest of the sand, thus securing what we find to be a proper mixture.

The "kink" is this: We had a tinner add a piece of galvanized iron about 15″ wide full length on one side of the mixer, on which can be laid a bag of cement, while the workman unties the end of the sack. The cement thus falls right into the mixer, the shelf giving it support while the wire end or tie to the bag is being handled. Without this shelf, as we call it, the workman must first loosen the wire from the sack, while on the floor next to mixer, and he has no rest without the shelf while he runs the sack back and forth to empty contents.—St. Peter Tile Works, St. Peter, Minn. [*Aug., 1918, p. 47.*]

## Copper Slag for Facing

A concrete stone manufacturer buys slag from copper furnaces—a lustrous black, jet-like material—for use as an aggregate in varying proportions with other stone in making granite stone. He buys it in carload lots as it is used throughout the body of the stone. A similar or perhaps an identical material has been sold in smaller quantities as a facing aggregate.

The stone manufacturer offers the interesting comment that this byproduct of the copper reducing furnaces may be actually a material very similar to that which makes the jet-like spots in certain granites. Granite being an igneous rock, was produced in crystallization after tremendous heat in which its ingredients were molten; the copper furnace product is but another route to a somewhat similar result. [*June, 1918, p. 207.*]

## Coring Heavy Stone Units

The Maul Co., concrete stone manufacturers, Detroit, saves concrete, makes lighter units and does so with a minimum of breakage and loss, by coring large cornice units by the insertion of clay building tile in the section which forms the overhang.

George Rackle & Sons Co., concrete stone manufacturers in the Cleveland territory for a great many years, core heavy cornice and other similar units by inserting core boxes when the concrete is tamped, removing a box when the top of the box is reached with the concrete, filling the space with damp sand, well tamped into place, and then filling the rest of the way with concrete. When the unit is hard this coring sand is washed out with a spray of water from a hose. This saves the cost of the clay tile, as used by the Maul company, but adds a little to the labor charge. Each company likes its own way best, and it is largely a matter of individual experience as to where the economy can best be effected. [May, 1918, p. 97.]

## Drain Tile Kinks

Farmers use our drain tile for culverts and they give better satisfaction than glazed sewer pipe. They use our tile for chimneys—slip an 8″ tile in a 12″ and fill the opening between with sand or concrete. Use cull tile to make foundation piers by filling the tile with concrete.

Also use large tile to make end fence posts by setting one 16″ tile on another; set in reinforcing rods and fill with concrete.

I am also interested in a factory here that manufactures hollow concrete drums with corrugated surface for land rollers or clod crushers. These give better service than steel drum rollers.—W. F. Schweiterman, Osgood, Ohio. [*June, 1918, p. 206.*]

## Glue Molds and Waste Molds of Plaster

Speed is sometimes obtained by a roundabout procedure. In making some large and very ornate urn-shapes for the parapet of a building an eastern manufacturer of concrete stone, most of whose products are cast in sand molds, obtained speedy delivery by the following procedure. The clay model having been approved by the architects, was reproduced in glue. A plaster mold was first made over the clay model, and the clay carefully cleaned from the mold. The plaster mold was used to make the glue model—the undercut surface ornamentation pulling out of the plaster just as a glue mold is released from a concrete cast. From the glue model as many plaster molds were made as there were concrete casts in the job. Each plaster mold was then filled with concrete and when the casts were hard, the plaster chipped away and the stone given the desired surface treatment. This was high priced work, the price being about $5.00 per cu. ft. of concrete. By the methods used all the casts were ready at approximately the same time. [*May, 1918, p. 179.*]

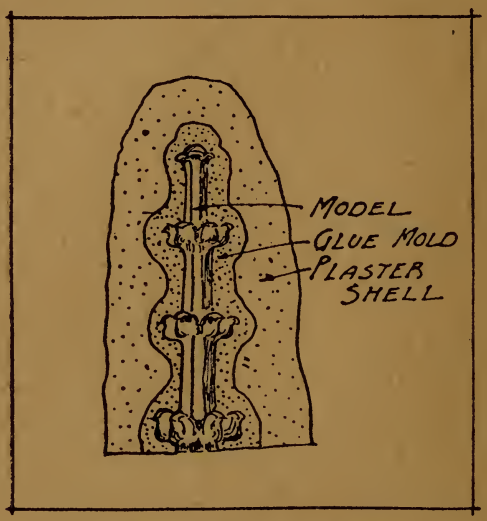
## Making Glue Molds

The sketch roughly indicates making a glue mold from a wood or plaster model of a finial such as are common to Gothic architecture. The model of either plaster or wood has the crockets modeled on in clay. If it is possible to make the crockets the same size, one is modeled in clay and a glue mold is made on it and the number of crockets needed are cast in plaster and set on the shaft. This saves modeling in clay, which is expensive, as it requires very skillful workmen.

The model is built up, shellacked and greased and a clay blanket about ¾″ thick is wrapped around it. The shaded portion around the finial in the sketch shows the glue mold within half its supporting shell

of plaster, and it serves as well to show clearly the position the clay occupies around the model and the shell around the clay before the glue mold is made.

The plaster shell in this is cast in two pieces. The second half is cast with the first half in position to form a close fitting joint, plastering up any




MAKING A GLUE MOLD

joints where liquid glue might run out. Next remove shell and then remove clay; after that the work is ready to replace shell, binding it tightly together and clamping it down; then pour glue into the space first occupied by the clay.

Remove the plaster shell and carefully peel the clay blanket off, then replace the shell and clamp it tightly to the table and plaster up the cracks between shell and table, out of which glue might run. The hot glue may then be poured into the shell through a funnel into holes previously left. (Keep the funnel full so as to deliver the glue under pressure.) It will occupy the space around the model which is left by the removal of the clay

blanket. Allow the glue to cool, at which time it will have congealed to about the consistency of rubber.

To gauge the amount of water required to soften the glue will require some experience. A little experimenting with small molds and a liquid density gauge or hydrometer will soon fit any person to turn out glue that will be tough and not too hard. It should be about the consistency of the candy commonly known as gum drops, which is nothing more than glue or gelatin mixed and coated with sugar. Set density down on paper in each of the successive trials and opposite this write the results. The glue must be cut into two pieces in order to remove it from the model and later from the concrete cast. The cut starts at the bottom at the end or nose of one of the crockets, and runs up over the top and down the other side directly opposite. This will leave one whole crocket and one half crocket on each side of it on each one-half section of the glue mold.

Paint the working surface of the glue with a paint consisting of white lead, turpentine and dryer. This will dry over night, and it is ready for greasing and casting.—Paul H. Beatty, Cleveland. [*July, 1918, p. 17.*]

## Loader for Batch Mixer

A concrete products plant in Akron, O., loads its Blystone mixer from an overhead hopper that has three compartments—a center compartment for cement, kept filled by cement elevated mechanically from the second floor level, and two other compartments, one each side of the cement receptacle, containing the fine gravel. All of this passes a ½" screen. A revolving drum forms a bottom for the hopper. This drum has compartments which fill

automatically by means of an agitator within the hopper, and bring out the cement and aggregate in the measured quantity to give the proportion desired for the output of this particular plant, which is practically standard. So many revolutions of the drum supply a batch of materials. [May 1918, p. 97.]

## Using Local Stone with Concrete

There are excellent possibilities for manufacturers of concrete trim stone in developing its use with natural stone of rustic character.

In New England considerable seam-faced granite is available in warm tones that mellow well with age. Trap rock in random masonry gives some very pleasing results. In glacial country, particularly on farms and in small towns, there are walls of split boulders. Several stone manufacturers have recently suggested that there is a good chance to develop the use of concrete trim with such local rocks. The particular local stone must be studied and an architect of ability should adapt the manufactured to the natural product. Color tones and special aggregate are at once suggested to produce a harmonious result. [*June, 1918, p. 207.*]

## Truck for Hauling Concrete Stone

The Hydro-Stone Products Co., Chicago, uses a 5½-6½ ton Mack truck, equipped with a steel framework and traveling 2-ton Ford hoist, for quick loading and unloading of trim stone.

The concrete stone is piled on small cars, suitably protected by wads of excelsior, and so stacked as to make easy units to handle at the rate of about ½ ton at each lift. Inasmuch as the dimension stone rests on two rails lengthways of the small car, a sling is slipped underneath (the sling consisting of a piece

of heavy belting), with a means of getting hold with the hook of the hoist for lifting.

A short haul for the Hydro-Stone company is about ten miles. Other hauls range up to 25 miles in length. The truck costs $12 a day to operate, but this includes all charges, depreciation, upkeep and driver. The platform, and framework for traveling hoist and so on, was put on for $450. With this equipment a truck can be loaded in less than ten minutes and unloaded in a slightly longer time.

This equipment makes the average delivery cost of dimension stone 10c per cu. ft. The data are supplied by J. K. Harridge, of the Hydro-Stone Products Co. [Mar., 1918, p. 95.]

# Surfaces

## Successfully Plastering On Concrete

I have used the following method for plastering on concrete and have yet to see it fail: The principle is as old as concrete itself. After the forms are taken off and all loose scales cleaned away, the wall is to be well wet down, then dashed with a mixture of 1 cement to 2 of sand, and care should be taken that this coat is not disturbed until thoroughly set. The sand should be clean and sharp and as coarse as possible; the thicker the plastering has to be the coarser must be the sand. The mixture is to be dashed on with a broom or paddle the same as is used on outside slapdash or rough coat jobs. If this coat can stand for 24 hours or more so much the better, but it must be set before next coat is applied.

The second, or floating coat, is to be composed of coarse sand tested for voids and just the right amount of cement added to fill the voids, plus 10% hydrated lime to make it work better, care being taken to avoid an excess of cement and to use as coarse a sand as possible. This coat is to be laid on with the trowel and struck off with the straight edge and allowed to set. If a float finish is desired, a rich mixture may be used for a thin skim coat, care being taken to lay it on thin, the richer the mix the thinner it must be laid.

The dash coat, if used, is placed in the ordinary way, but whatever finish is used care must be taken that the under coat is thoroughly set. There is nothing difficult about plastering with cement mortar if the principles of concrete are adhered to. Tests for voids, shrinkage of materials, clean materials, non-disturbing after placing and proper curing, will

invariably bring satisfaction in any kind of concrete or cement work.—E. Bewley, Modesto, Calif. [*Feb., 1917, p. 50.*]

## Suggestions for Impervious Non-Crazing Floor Surface

A good concrete floor surface of light color and sufficiently impervious to stay looking well is not always obtained—much to the disappointment of architects and owners. E. Y. Bragger, Representative Sandusky Cement Co., at Providence, R. I., describes a method of finishing floors and other surfaces where a fine finish is wanted. As is generally known, excessive troweling, in an effort to get a smooth, hard surface, frequently achieves that result only temporarily and the smoothness is not permanent. Crazing frequently results in a surface which absorbs dirt and soon becomes unsightly. Mr. Bragger recommends a surface course of 1 part Medusa waterproofed white cement and 2 parts of crushed marble, ⅛" to 40-mesh size. If a coarser grain is desired about 2 parts of a larger size of marble may be added. After being struck off these materials should be allowed to set for a sufficient length of time to become firm before finishing with a steel trowel (excessive troweling is dangerous). After troweling (just as little as possible), allow to set for 3 days, keeping wet, then rub with stone or rubbing machine to remove trowel marks and cement film. Scrub with 10% solution muriatic acid and thoroughly rinse with clean water. Grout into the surface a mixture of 1 part of the cement and 1 part of fine marble. Allow to set for 1 week or more, keeping the work damp. Then rub with stone or rubbing machine until desired surface is obtained. Floors can be brought to a polish by this method.

This method, Mr. Bragger says, has been used successfully where a floor was required that would not discolor. This method has been used by the Ossining

Pressed Stone Co., Ossining, N. Y., for steps, walks and curbing on work of extra quality for large estates along the Hudson river. A similar method is used by Paul Vogt Sons, Everett, Mass., and Chester Rowley, Pawtucket, R. I., on cast stone.

Mr. Bragger also describes a different method, where more speedy finishing is necessary, as follows:

Forms must be tight on all sides. Should they be rusty or dirty, brush with stiff brush, then stop up all crevices and paint or trowel sides with plaster of paris. Surface coat to be from 1″ to 2″ thick; base must be rough and clean, and well wetted. Should the face be smooth, sift on a light layer of clear cement. For the surface coat mix 1 part of Medusa waterproofed white cement and 2 parts crushed marble (⅛″ to 40-mesh sieve), and after mixing the two together thoroughly, add water slowly until the proper consistency is obtained (not too wet). Spread evenly as you would plaster instead of throwing on by the shovelful. This causes the larger size aggregates to remain where placed, the smaller to work away under the trowel. Trowel firmly but not too much with steel trowel, and strike off with a straightedge. Float easily with wood float. Cover with clean canvas, sprinkle on dry marble or white sand; allow to set. It will be found this covering removes excess moisture and makes troweling possible in 20 min. to 30 min. Then finish with steel trowel. Trowel only enough to get an even surface (excessive troweling causes the cement and finer particles to come to the top, which is often the reason for cracks and crazing). Cover and allow to set for 24 hrs.; then rub with fine carborundum, to remove the cement film. Careful rubbing is necessary at this stage, as the cement is still green. Scrub with a 10% solution of muriatic acid and thoroughly rinse with clean water. Grout into the surface with trowel or brush a thin coating of neat cement. Keep damp and finish with fine stone or rubbing machine any time after 1 week, or when the job is finished.

The latter method is very simple but judgment is necessary. Floors, steps and so on can be laid, struck off and finished in less than a half day; watching, worrying and overtime are avoided. If a coarser grain is desired, add 2 parts to 3 parts of larger stone. Water pockets are overcome and the cement is readily taken up in the surface and not left to work around under the trowel; hence a denser work results.

[*July, 1916, p. 10.*]

## Solving the Crazing Problem

To prevent crazing, adopt every means to avoid excessive surface shrinkage of the concrete—particularly in the early stages of hardening.

1. Avoid an excess of fine material—either cement or stone dust.
2. Avoid the use of excess mixing water.
3. Avoid methods of placing and finishing which leave a film of fine material on the surface.
4. Adopt methods of surface finish which will remove the surface film of fine material and leave coarse material exposed.
5. Adopt methods of curing which will *keep* the surface wet, uninterruptedly—in distinction from wetting down surfaces which have become dry in the early stages of hardening.
6. The use of calcium chloride in the mixing water is suggested, but should be used only with caution. [*Oct., 1917, p. 99.*]

## Inconspicuous Concrete Walks

To get the pebble effect on concrete I used mostly coarse pea-sized gravel and as little sand as possible, without the customary layer of fine material. That is, I had one mixture right to the very top. Then I washed the surface with muriatic acid, using a stiff brush and washing it after it had eaten the surface skin of the cement, possibly brushing when green might produce the same effect without using acid. But in my case I used acid after it had hardened.

Another way would be to make an ordinary mixture and then float selected gravel on the surface while green.

I filled the edges with black dirt, so that the lawn or long grass will encroach on the sidewalk and the soil be a little higher.—Wilhelm Miller, Detroit. [*Jan., 1917, p. 32.*]

## Finishing the Sidewalk

One of the most difficult problems in sidewalk work is in the application of the top coat. In the first place there must not be too much water in the mix and at the same time there must be just enough water so that the top will spread out evenly and trowel up quickly. The worst trouble is to get the finished top troweled up *quickly*. The more concrete work is troweled, the more apt we are to have trouble from separation of the top coat from the base concrete. As I have told finishers who worked for me:

*"Almost anyone can take a float and trowel and finish up a piece of concrete work smoothly, but it takes an experienced finisher to trowel concrete quickly and get over a lot of work."* I leave strict instructions with the finishers to go over their work with a wood float *once* and *twice* with a trowel. Then we take no chance of loosening the top coat from the base before the top coat has its initial set. Anyone familiar with the troweling of finished surfaces of concrete will find that when a surface has been troweled too much it will work back and forth, almost like rubber, which loosens the top before it has a chance to set.—Frank L. Shoemaker, Kalamazoo, Mich. [*July, 1917, p. 6.*]

## Pebble Surfaced Sidewalk

In front of and around Tower Court at Wellesley College, Wellesley, Mass., is a concrete sidewalk unusually well suited to its attractive surroundings. The ordinary cement sidewalk does not blend at all well with grassy and leafy landscapes. Walks that curve among trees and shrubs and flowers must be made to serve without obtruding. The ordinary walk does obtrude.

The walk at Wellesley is quite different. It has a pebbled surface in harmonious tones. It was built under the personal supervision of C. A. Sawyer, Jr.,

Vice-Pres. of the George A. Fuller Co., Boston, the contractors. Mr. Sawyer describes the work as follows:

"The walk surface was produced to meet these requirements: A non-slip surface; a color to harmonize with the masonry of Tower Court; an interesting though not pronounced surface texture; the elimination of surface jointing—irregular shrinkage cracks not being objectionable.

"The construction consisted of a base course of 1:3:6 concrete 4" thick, on which was screeded off a topping of 1:3 portland cement mortar 1½" thick—before the base course had received its initial set. Water worn gravel screened through 1¼" mesh and caught on ¾" mesh was then closely spread over the walk surface and forced into the mortar to the desired surface levels with wood floats similar to those used by cement finishers. The spreading and tapping into place of the gravel was done in the same way as working marble chips into a mortar surface in the construction of a terrazzo floor. After the cement in the top had received its initial set, and not before, the mortar in the interstices of the gravel was removed to a depth of 3/16" by the careful use of scrubbing brushes with soft bristles. An hour or so later, the pebble surfaces again were brushed, using a small amount of water on the brushes. This removed the cement film on the gravel caused by the first brushing. In both instances the brushes were cleaned very frequently to give definition and character to the surface. After the cement had received its final set, the walks were kept damp for several days to insure proper curing.

"The success and permanence of this kind of pebbled surface depends on the care with which it is brushed and the clean condition of the brushes. If the pebbles are even slightly dislodged during the process, the

cement bond is destroyed and sooner or later raveling will result. The work was done by common labor.

"The sidewalk was laid in the spring of 1915. The pebbled surface cost approximately 25 cts. per sq. yd. more than it would had the surface consisted of 1:2 cement mortar, troweled twice.

"There is no doubt in the writer's mind that residence walks can be constructed of concrete 3½" or 4" thick, using a gravel aggregate, provided the top surface is carefully brought to the correct profile by tamping. After the cement is brushed from this surface there is no reason why the same appearance cannot be obtained as in the work at Wellesley. It is, of course, wise to lay these walks on a dry gravel or cinder foundation of from 8" to 12" thick." [*Aug., 1917, p. 45.*]

## Chicago Park Buildings Faced with Special Mixture

In some interesting work in the surface texture of concrete, involving no treatment of the concrete after the removal of the forms, two mixtures of concrete were used, a porous facing mixture of comparatively dry consistency and a structural backing of a wet mixture such as is ordinarily used in building work.

This work is done for the South Park Commissioners, Chicago. It is not new, having been introduced on the park building work of the commissioners in conjunction with the late D. H. Burnham about 10 years ago. The work of this character has been developed considerably since that time and is now being used on practically all the new recreation buildings, of which those in Grand Crossing Park, now under construction ,are examples.

The surface concrete is composed of 2 parts cement, 3 parts of washed torpedo sand and 9 parts washed crushed limestone varying in size from ⅛" to ¼". The mixture is somewhat plastic—sufficiently so that it will adhere when pressed in the hand.

The standard thickness of the walls of these buildings, not considering pilasters and cornice ,is 18″. This is composed of a 4-in. tile center with 7″ of the dry mixed concrete on the outside and 7″ of wet mixed concrete on the inside. The interior side of the wall is composed of regular wet mixed 1:3:6 concrete. The walls are built in 8-in. layers, the tile being laid first, then the surface concrete and the wet mixed concrete on the inside of the wall last. In placing the surface concrete it tamped very hard for a width of about 5″ next to the tile and very little at the front. By using very small stone of nearly uniform size and a dry mix, tamped in this manner it is possible to crowd the concrete forward into the molded design of the forms, bringing out every detail of the design and presenting a uniform rough exterior finish. In mixing the concrete for the surface only about ⅓ as large quantity of water was used as for the wet mixed interior part of the wall.

The inspectors for the South Park Commissioners say that the artistic results obtained in placing concrete in this manner depend upon the uniformly small size of the stone, great care in securing evenly mixed concrete of uniform moisture and the skill in tamping, to crowd the concrete forward into the molded design of the forms. [*July, 1916, p. 3.*]

## Cleaning Concrete Floors

We clean the concrete floors in our house thrice weekly with a watery solution of Sig. Cresol Comp. 5% and apply daily the following with a mop:

| | |
|---|---|
| Kerosene | 120.0 c.c. |
| Good soap | 250.0 og. |
| Turpentine | 60 c.c. |
| Boiling water | 6.0 liters |

The floors are swept clean and all dirt and dust removed. After mopping alternate days with Sig. Cresol Comp. U. S. P. and hot water, the above mentioned solution is applied hot, after emulsifying.

This last solution is used several times a day and well rubbed in with a piece of blanket in a mop handle till the floors take a beautiful polish. The formula of this compound is as follows:

| | |
|---|---|
| Cresol | 500 grams |
| Linseed oil | 300 grams |
| Potassium Hydroxide | 80 grams |
| Alcohol | 30 milliters |
| Water sufficient to make up to 1,000 grams. | |

This is rather a difficult formula to mix so do not try to make it yourself. If you want a small quantity your local druggist can probably furnish it; if you want large quantities—from a gallon up—buy it from a wholesale druggist or a reliable pharmaceutical manufacturer.—Dr. F. W. Dudley, Manila, P. I. [Jan., 1918, p. 32.]

## Preventing Efflorescence

The experience of most manufacturers not only of roof tile, but in other lines, indicates that when efflorescence appears, the remedy is in altering the mixture of materials and in manipulation so as to get a denser concrete. The appearance of white spots, or efflorescence, when the products dry out, is due to the deposit on the surface of soluble salts taken up by moisture in the product. When this moisture evaporates the salts in solution are brought to the surface and deposited there. This could not take place in an extremely dense product and it will be a good thing to have your materials, either crushed stone or sand, carefully tested in order to learn exactly the proper mix to use to get a more dense mixture. Looking into the matter of mixture very carefully will surely repay you, even if it is necessary to go to some small expense for tests, because there will probably be less breakage and the chances are it will develop that you can make your products more economically by knowing exactly how much cement should be used with a given mixture of sand or stone. [*Sept., 1917, p. 88.*]

## Brush-Finishing Concrete Surfaces

A finish for concrete that will give a uniform and very satisfactory surface is produced with a whitewash brush as the finishing tool.

Remove the forms at the earliest possible time—paint the surface with a grout of 1 lime, 2 cement and 3 fine sand, mixed with water to a creamy consistency and kept thoroughly stirred.

Follow the application of the mixture with a thorough rubbing of the surface with a wood float to fill thoroughly all pin holes and produce an even texture.

As the excess moisture disappears brush the surface lightly in both directions with a dry brush to obliterate all float marks and produce a sandpaper-like texture. The surface thus treated will be very light in color and the effect is permanent under most conditions. [*June, 1918, p. 206.*]

## Mosaic in Concrete Surfaces

In the enrichment of concrete surfaces by means of mosaic, the mosaic is formed by squares of marble from ¼″x¼″ to 1″x1″ and about ⅜″ to ½″ thick; these have been sawed and have a level surface on each flat side. They may be split with a very short cold chisel, the stone resting on an iron block or anvil. The stones or Tesserae, as they are called, can be laid with the rough or split surfaces out or with flat surfaces exposed. In many cases the depressions necessary to contain the tesserae can be cared for in the mold or form, in others the spaces can be lowered before it has become too hard.

The stones may be soaked in linseed oil for several hours to make their color brighter and then set in soft mortar, or they can be used as they are after wetting them. Sometimes for flat panels on walls or floors, the stones are glued on paper, face down, with gum arabic.

The soft mortar bed is then laid and the design reversed and laid in the wet surface. It is then pressed down and leveled with a heavy block and the paper soaked off.—Charles T. Scott, School of Industrial Art, Philadelphia. [Jan., 1917, p. 10.]

## White Surfaced Stairs with Rubbed Finish

In constructing a six-story and basement mill constructed building with fireproof stair towers consisting of reinforced concrete stairs supported on brick walls, a departure from the ordinary method of finishing was made on the main stairs, from the street to the office on the second floor. Instead of an ordinary portland cement finish something possessing a little more life and color was desired and a special white finish 1″ thick was therefore used on risers, treads and landings. This was composed of 1 part of Medusa white cement, 1 part of the standard white Ottawa sand and 1 part of marble chips passing a ½″ mesh with all dust removed and was placed on the concrete base before the latter had taken its initial set. It was then given a smooth troweled finish and after seasoning for a few weeks (during March) the surface was polished to reveal the aggregate and give the appearance of a marble mosaic surface. The landings were polished with a Berg rotary surfacer and the risers and the portion of the treads back of the Mason safety tread and nosing strip at the edges of steps were polished by a small cylinder grinder. The corners and angles were finished by hand.

The results obtained are highly gratifying and at a much lower cost than marble, although possessing almost as fine an appearance. The construction, however, developed some facts which, if heeded in future work, will unquestionably give better results.

In the first place the concrete base (mixed with ordinary portland cement) was in some cases put in

too wet and in some places where pressure was brought to bear on the finish coat the dark mortar oozed up through the white finish and resulted in dark spots or veins in the finish after polishing. The remedy for this is, of course, the use of a somewhat drier base course, not too dry, but of such consistency as will require some tamping or spading to flush water to the surface.

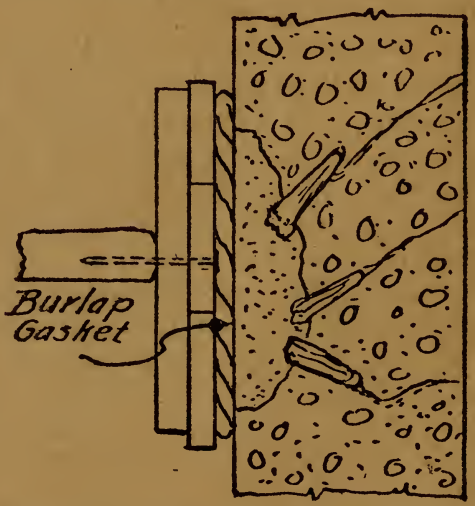
In polishing the surface of the special finishing mixture, it was found that considerable extra time had to be expended in order to obtain desired smoothness, owing to the presence of the sand grains which at first tended to pull out of the surface under the action of the machine. In future work of this kind, it would therefore seem a wise precaution to abandon the use of sand altogether, and use only white cement and marble screenings varying in size from ½" particles to dust, taking care, however, not to get too much of the dust in the mixture. It would seem that the proportion of 1 part of white cement to 1½ parts or 2 parts of marble screenings is the proper one for this class of work, where a good wearing surface is required.—A. M. Wolf. [*July, 1917, p. 5.*]

# Miscellaneous

## Patching a Leaky Concrete Wall

The writer has used hydrated lime in common mortar for repairing concrete walls leaking copiously under hydrostatic pressure, following this simple but effective method:

The concrete is cleaned around the leak and loose particles cut away. Running water is cut down by driving wooden plugs and patches of burlap into the




Stopping a Leaky Concrete Wall

crevices. A form is prepared, upon the face of which a ½″ twisted burlap gasket is nailed and a stout brace, sufficiently long to reach the opposite wall is fastened to the back of the form.

Common 1:2 mortar, mixed to a thick plastic consistency and containing 10% (by weight of the cement) of hydrated lime, is placed on the face of the form, inside the gasket, in a cone-shaped mass. This is pressed firmly into the leaking cavity, while the form is

given a twisting motion, to expel surplus mortar. The brace is then driven home.

In a day or two the form may be removed.

Large, leaking areas can be attacked and repaired in this manner without the tedious labor of "bleeding" the concrete or draining from the outside.

The Werk Soap Co.'s new plant at Cincinnati is built on low, waterbearing soil. Several large pits were sunk inside the building and walled with 1:2:4 concrete containing hydrated lime. One pit leaked badly because the pump broke down while concreting and much of the concrete was deposited in water. The method described and illustrated effectually stopped all leaks.—Edward O. Keator, Cincinnati. [*Feb., 1917, p. 51.*]

## Strengthening Columns of Reinforced Concrete

The strength of reinforced concrete columns may be increased in the same manner as the repairs were made to the buildings injured by fire at the Edison Plant, Orange, N. J. The writer designed the reinforcing of these columns, to be made as follows:

All of the injured exterior of the columns was removed by hand tools, and the remaining good concrete was surrounded with steel spirals ¼″ in diameter, with a pitch of about 2″. These spirals were of such diameter as to fit closely to the old concrete on the corners, leaving considerable space between the spirals and the sides of the originally square columns. Vertical steel in proper amount was placed inside the spirals. Steel forms were then placed about the columns. The diameter of the steel forms was approximately 3″ greater than the diameter of the spirals, so that there would be at least 1½″ of fireproofing. After the forms were in place concrete, consisting of one part cement to two parts of sand,

but with no large aggregates, was poured through holes in the floor slab above to fill the column forms. After the concrete was poured into these forms and had set, the forms were stripped and the concrete column, I believe, may be considered to be as strong as though it had been originally cast of the finished size casing, being a 1:2 mixture, instead of something leaner, will be stronger than the interior core, but I do not believe that the extra strength of this outside casing should be assumed as the strength of the column.

With reference to reinforcing columns in a building, to take greater loads than they are designed for, this should be a simple matter and could follow the same ideas as above outlined. I believe there will be more trouble in strengthening the foundations to take the added load than there will be in reinforcing the columns themselves.—T. L. Condron. [Oct., 1918, p. 139.]

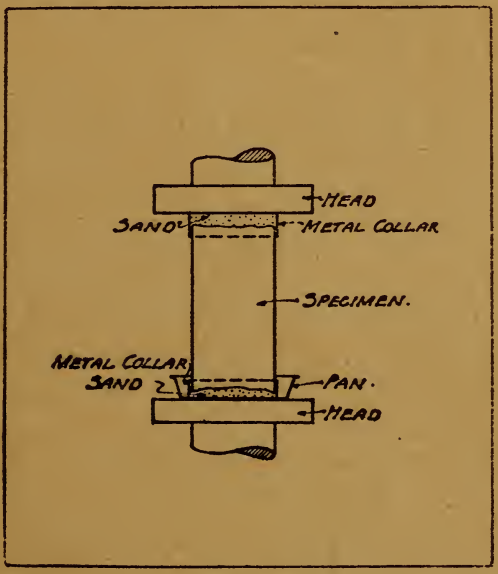
## Some Drafting Room Kinks

We have discovered, writes William Osborne Sell, Birmingham, Ala., that pencil drawings on tracing paper could be made twice as fast as ink on cloth. However, the blueprints were very poor. This was overcome by using black carbon paper behind the paper, placed so the carbon impression would come on the back of the tracing. This reinforced the pencil drawing and permits good blueprints to be made. Changes were easily made.

All of our drawings for concrete work are made in a uniform size. One sheet of typical details was made, showing beam shapes, section through typical terra cotta slabs, and through typical metal tile slabs, typical column details, typical bending details, etc. Each detail is numbered and the framing plans call for "Detail No. 24," for instance, instead of a special section, as heretofore. [*April, 1918, p. 137.*]

## Test Specimens Bedded in Sand for Quick Work

Recently we have had to test in rapid succession several hundred specimens, whose ends were not exactly true. Plaster coating was out of the question on account of the time and labor involved. To get even bearing, therefore, we took strips of galvanized iron about 1″ wide, and wrapped them around either end, tying them loosely in place with a wire.




TESTING CYLINDERS BEDDED IN SAND

These collars were then drawn about ⅜″ beyond the end of the specimen. The lower end of the specimen was then set in a small tin pan full of loose sand, the collar going down into it. The top collar was then filled with loose sand and struck off and the specimen placed in the testing machine.

As pressure is applied the collars slip along the specimens until the sand takes a hard bearing. Testing then goes on as though the specimens had been capped with plaster. We have found that this method gives

very consistent results, and is fully equal to plaster in every way. Needless to say, it can be applied to specimens other than cylinders. The inception of the idea was in some experiments made prior to grouting in sand strata. I found that 400,000 lbs. of pressure on an inch diameter plunger was insufficient to force cement grout more than ¼" into the sand. At the same time I found that the lateral pressure on the container was very slight indeed. These results I have tried in the foregoing test methods.—Nathan C. Johnson, Consulting Concrete Engineer, N. Y. C. [*Dec., 1918, p. 199.*]

## Drip for Porch Floor

In putting down a concrete porch floor, overlapping a brick wall, a good drip should be put in to keep the wall clean when the work is done, as well as to keep it clean afterwards, as these walls otherwise get badly discolored in time. I use a galvanized iron strip for this, which is easily made. I


Drip for Porch Floor Projection

used to try to cast in a wood strip, and often broke the edge off in trying to take it out. The iron strip remains in, and if in time it corrodes and falls away entirely it will have formed the drip in the concrete without weakening the edge. The galvanized iron, however, should last a great many years.—Vernon Redding, Architect, Mansfield, Ohio. [*May, 1918, p. 156.*]

## Better Blueprint Specifications

Next to printed specifications, the most logical and best suited for the purpose are blueprint specifications, since they form a record which cannot be readily altered or changed without disclosing the fact and, what is more, every copy is an exact duplicate of the other. This is not true, for instance, when 10 sets are needed and all are to be typewritten on white paper. With due allowance made for carbon copies, the making of these would involve two or three distinct operations, thus increasing the chance of error.

Blueprints of typewritten originals are not always clear and distinct, even when written on onion skin paper. An excellent blueprint is obtained from an original sheet if it has been backed up by a carbon sheet when written, thus making a negative of the material on the back of the sheet. Changes cannot be made as readily on such sheets as when written on the face only, but this is an asset rather than a disadvantage, for it tends to make the stenographer exercise more care in writing than if changes can easily be made.—Albert M. Wolf, principal assistant Engineer, The Condron Co., Chicago. [*June, 1918, p. 208.*]

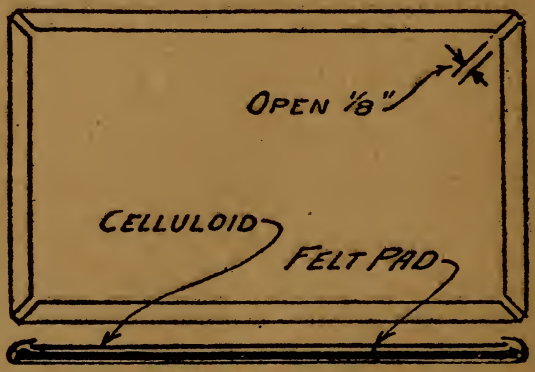
## Mixer Runs Make-Shift Pile Driver

A concrete bridge became undermined by flood, necessitating the use of steel sheet piling, the low clearway prevented the use of an ordinary pile driver, so a discarded jaw from an old stone crusher was secured, a runway made of plank and suspended from the bridge, with a block fastened in the head and a small concrete mixer placed in position, with the gearing removed. This was used for motive power to drive the sheet piling, using the loading lever hoist to operate the driver.—H. W. Cregier, County Superintendent of Highways, Schenectady, N. Y. [*May, 1918, p. 154.*]

# Blue Print Holder

Where blue prints must be constantly referred to, a holder described by Henry J. Harms, engineer and builder, Courbevoie, France, as used in connection with the housing work done in France, is worth while.

The holder consists of a piece of sheet metal of a size to fit the drawings to be used. The edges are




BLUE PRINT HOLDER

turned in as shown by the illustration. In use the piece of heavy felt is placed as a backing, then the drawing is slipped in and a piece of celluloid placed by bending and springing in as shown. The whole trick lies in the construction of the corners, which are not closed but left open about 1/8", which allows the celluloid to work into place without cracking while the felt backing serves to keep the drawing and celluloid cover pressed tightly in place against the metal frame.

There would of course be a practical limit to the size of this kind of holder but for small sized prints such as are used in housing work, or photostats from large drawings which are now being used a good deal on large jobs, the idea seems to have a good deal of value. [*Apr., 1918, p. 32.*]

## Fixing a Triangle to Avoid Blots

On very hot days in the summer I have found that the ink from the ruling pen is attracted very easily to the edges of the triangle, running under the latter and causing disagreeable blots, which destroy the neatness of the tracing and very often the disposition of the draftsman.

In order to avoid all these difficulties, simply take a pocket knife and shave off all sides of the triangle to a bevel extending about one-third the thickness of the material. A cross-sectional view is shown.

By this little scheme, blotting of the cloth becomes


FIXING A TRIANGLE TO AVOID BLOTS

almost impossible, and I have found also that the bevel is useful in case it should be found necessary to trace a line immediately adjacent to another wet line, the bevel covering the wet line without smearing it, and the draftsman is able to reach to desired line with his pen.—L. H. Christen, Champaign, Illinois. [*May, 1918, p. 156.*]

## Getting Stucco Jobs

A stucco contractor makes winter search for houses that look "pitted," with paint peeling off. Then he tries to get in touch with the owner and convince him that what he needs for his building is not another dose of the paint brush, but an overcoat of concrete stucco. [*Apr., 1917, p. 133.*]

## Leaky Basements Made Waterproof

My work in the last five years has been mostly repair work. I have waterproofed something like fifty or more basements of all kinds, the largest being a school 32′ x 50′, two stories, with full basement. The water was 18″ deep when I took the contract. The contractor had a sump on the outside of the building, with 3″ centrifugal pump, automatic motor driven, and when he laid his floor he pumped most of his cement away with the water, leaving the floor porous all over. My first work was to dig a trench through the old floor, through sand and gravel 18″ deep, to the lower water level, and cover the trench with a reinforced concrete floor. I then plastered the inside walls ½″ thick with mortar 1 cement to 1½ of fine sand. There were two brick walls 10′ apart the short way; these I plastered 30″ high on all sides, using 12 lbs. of Ironite to every 100 square feet of surface for all plastered work.

I then laid a 6″ floor of 1:2:4 concrete, using American fence wire for reinforcing, floor being laid without stopping. The top coat was laid the next day, using ¾″ screeds and treating floors as side walls. After standing for 10 hours I pumped the water back into the basement, 18″ deep, or to its own level outside, and let it stand 7 days, pumped out water and dried out.

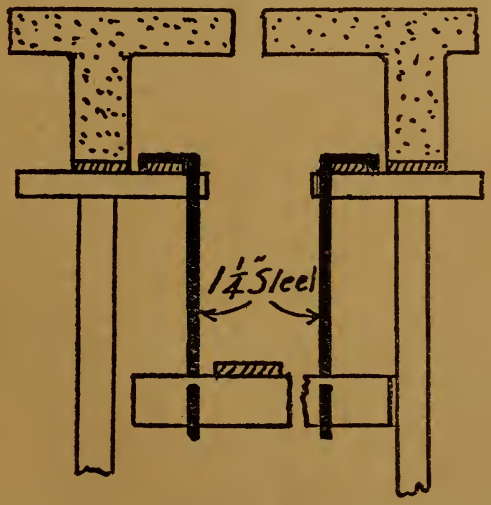
The school board turned irrigation water into the ditches 6′ away from the schoolhouse to test it out. All O. K. That was 7 years ago and all the others have been treated the same, except the boiler room and cool room, 15′ x 30′, under a theatre, 16′ deep, with 5½′ of river pressure. The coal floor was 1′ higher than the boiler room floor, so we moved the boiler into the coal room, cleaned the floor with muriatic acid straight. I used a 2″ top. Took pressure away by drilling ¾″ holes in walls, using ¾″ pipe.

There is always a great deal of trouble with water under furnace floors, under fire grates. They will either burn out or crack, no matter how deep the concrete floor is, on new work or old. To remedy this, raise the boiler 6″ or 8″, then lay down building paper on the old floor. Lay new floor on the paper, so it will not bond to old floor. Mix the concrete 1:1½:3. Firebrick is, however, better as a heat absorber.—O. Robinson, Boise, Idaho. [*Oct., 1918, p. 130.*]

## A Scaffold for Removing Forms

The removal of forms in high storied buildings calls for some type of scaffold that can be handled rapidly.

For a recent job hooks were made of 1¼″ steel, as shown in the illustration. They were hung over a




A Handy Scaffold for Wrecking Forms

plank supported on shore heads and carried on edge a plank, over which the floor planks were laid.

Adoption of this idea would be useful in many places.—R. H. Washburne, Milwaukee. [*Feb., 1917, p. 51.*]

## Improvised Light System for Night Work

Electric power is usually available in construction work and simplifies the question of supplying light for night work. Have a circuit run into the building to the hoist tower and then run it up one post of the tower. Leave a socket, fastened to the post at each floor level, for leadoffs. On account of dropping concrete a piece of board should be nailed over the socket to protect it. Have the switch for this circuit in a box that can be locked. When light is wanted on any floor it is a simple matter to attach a flexible cord to the socket on the post. All sockets on construction should be of composition other than porcelain, as it is less likely to break.

Very bright lights can be made of old automobile headlight reflectors. These can usually be picked up at any automobile wrecker's shop for about 50 cents. As these reflectors are used for very small lights it will be necessary to saw off the bottom to receive an ordinary sized lamp. Make a square box so that the reflector can be fastened to it. A socket is placed in the bottom of the box and the lamp inserted. Cover the box with ½" mesh wire cloth for protection. A 40-watt Mazda lamp in such a reflector will give a light so strong that it cannot be looked at directly. On the back of the box put a hook so that it can be hung on a nail. With each light should be enough flexible cord to reach the farthest corner of the building. Cluster sockets can be inserted in the socket on the hoist tower post when several lights are needed. [*Feb., 1917, p. 88.*]

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When building forms it is well in many places to nail through a bit of lath. This allows the forms to be drawn tight and when wrecking the lath may be split allowing the nails to be drawn easily.

## Soap-and-Alum Waterproofing

The soap-and-alum process in waterproofing has been used frequently by engineers of the War Department. It is described in the 1901 report of the Chief of Engrs., U. S. Army, as follows:

The soap-and-alum (Sylvester) process was used in "waterproof mortar" and applied to both horizontal and exposed vertical surfaces. This mortar was made by taking 1 part cement and 2½ parts sand and adding thereto ¾ lb. of pulverized alum (dry) to each cu. ft. of sand, all of which was first mixed dry, then the proper amount of water—in which had been dissolved about ¾ lb. of soft soap to the gal. of water—was added and the mixing thoroughly completed.

The mixture is a little inferior in strength to ordinary mortar of the same proportions and is impervious to water, and is also useful in preventing efflorescence. The alum is in excess for the reason that it coagulates other things than soap that may come to it.

The process was applied in connection with concrete construction in fortifications at New York Harbor. Similar treatment is known to have been used somewhat extensively elsewhere in work of like character.

[*June, 1916, p. 272.*]

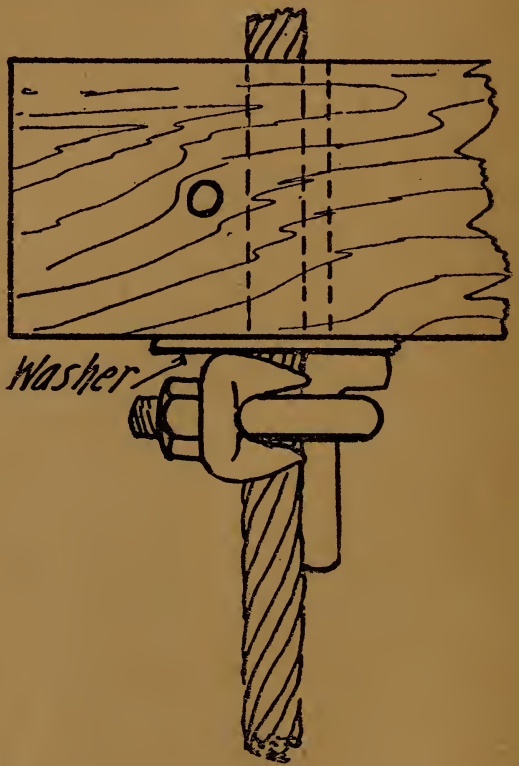
## Indicating Concrete Sections on Plans

Where large areas of concrete are shown in section on the detail plans of concrete structures a firm of industrial engineers has found that excellent results can be obtained at a much lower cost than by the usual "stone and sand" indication, by blackening the sections on the back of the tracing cloth with an H or HB grade pencil after the gloss has been partially removed by an ordinary eraser.

Where the usual symbol "broken stone and sand" is used to indicate concrete in section it has been found best to do this ink work on the back of the tracing. Changes and erasures can then be made quickly without interfering with the section symbols, thus saving time.—Albert M. Wolf, principal assistant engineer, The Condron Co., Chicago. [*May, 1918, p. 153.*]

## Improvising a Swing Scaffold

The usual type of scaffolding in use on steel frame and reinforced concrete buildings is in the form of a heavy floor hung by steel cables or rods from outriggers projecting from the roof.




USING STEEL CABLE AND CABLE CLIPS TO BUILD SWING SCAFFOLDING

This scaffold is raised and lowered by means of special devices, which are efficient when available. It often occurs, however, that this equipment is not at hand or the work in question will not warrant its purchase. In constructing a new steel frame building at a cement plant recently it become necessary to provide scaffolding to a height of 50′ throughout a large building. The outlay for lumber and labor would have been

very large. The contractor secured a quantity of discarded cable of ample strength for scaffolding purposes and by means of cable clips arranged suspension lines hung to the steel roof frame at proper locations.

The method by which the scaffold floor was secured to the cable is shown by the illustration. A small piece of iron was bent to a right angle and clipped to the cable. This formed a support on which scaffold bearers with notched ends could be supported. A slotted iron plate between the clip and the wood would form a better bearing, if available, or enough washers could be strung on the cable before the staging was built to provide for the required number of lifts.

Raising the scaffold is effected by placing a second set of clips and bearers, when the floor planks can be raised readily to the next level. This leaves the first set used available for still further use. [*Feb., 1917, p. 50.*]

## Calcium Chloride to Accelerate Hardening

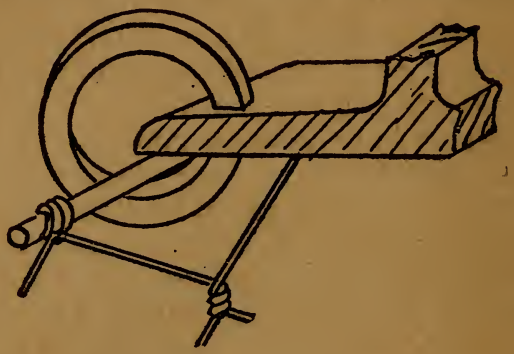
The use of calcium chloride to accelerate the hardening of concrete is discussed briefly by S. W. Stratton, Director Bureau of Standards, in a recent letter as follows:

In a recent investigation we found that the use of a 4% solution by weight of calcium chloride in place of the mixing water materially accelerates the hardening of concrete, but does not appreciably affect the time of setting. This acceleration varies somewhat with different cements; with some cement in 1:2:4 concrete we found the strength increased about 100% in 24 hrs. and 48 hrs. This, we believe, is due to the more complete hydration of the silicates and aluminates, for it was found they were more completely hydrated when the calcium chloride was used. Its use increases the cost of concrete 12 cts. to 15 cts. per cu. yd. For best results, it is important that the concrete be mixed to a quaking or mushy consistency, but not fluid consistency. Calcium chloride should be used with caution in reinforced concrete, as the presence of the calcium chloride will accelerate any corrosion of the reinforcement which may occur.

[*July, 1916, p. 28.*]

## Clip for Attaching Wire Mesh to Steel Work

To attach heavy wire mesh quickly and cheaply to structural steel sections, Carl Weber, of the Torcrete Shipbuilding Co., uses steel spring washers made



USING A SPRING WASHER AS A CLIP FOR ATTACHING WIRE MESH TO STEEL WORK

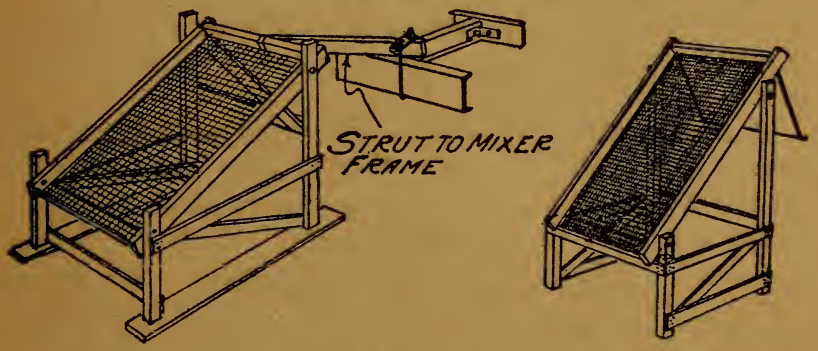
with an opening that allows them to be forced over the flange of a steel member by a hammer blow, as shown. [*May, 1918, p. 155.*]

## Pay a Man What He Earns

After trying it both ways, I have found that to have a standard price for my men is a failure, because there are but few men who will continue to be speedy when working alongside a slow, loafing fellow. If the slow loafer is getting as much money as the speedy number 1 man, he will never speed up in the world. Your first-class man will soon slow down to the slow man. Thus you spoil the good one and never improve the poor one. Otherwise, you can make a good man out of the loafer on the job, many times, if you pay him less, with an increase in wages just as soon as he makes himself worth it.—Charles J. Behler, Oregon, Ill. [Oct., 1918, p. 121.]

## Gravel Screening Kinks

On one job, the layout was such that we served local gravel direct into the charging end of a small gasoline driver mixer, from the railroad car. The mix was 1:4, as the gravel was excellent, coarse and uniformly graded, dredged from a nearby river. At the same time, screened sand was required for mortar. The gravel was wet and hard to screen. There was considerable vibration from the mixer engine and our foreman conceived the idea of attaching the mixer frame to the screen by a wooden strut, making a




TWO GRAVEL SCREENING KINKS

shaking screen. It kept two men "humping" to shovel gravel into the screen fast enough to feed the mixer loader and the mortar men. The quantity of screened sand was increased materially with a reduction of the entire screening crew. It sure was a money saver and a speeder.—W. H. Scales, Danville, Ill.

An inexpensive and convenient device for screening sand and gravel, and at the same time loading them into wheelbarrows, will prove convenient on many small jobs. It is described by Harold J. Spellman, in the *Engineering News-Record.* It consists of a chair-shaped frame, supporting a screen, which can readily be made adjustable to several angles for varying aggregates. If desired, two or more screens of different mesh can be made interchangeable with the frame.

In using the screen, one wheelbarrow is run in from the back and catches most of the sand, and the second wheelbarrow is run under the lower end of the screen and receives the stone.

Some time ago CONCRETE described a somewhat similar arrangement, which had the added feature of a shield to prevent the scattering of the sand, as indicated by the illustration. [*Sept., 1918, p. 92.*]

## Screening Gravel at the Pit

The following method of delivering reasonably well screened gravel is applicable to pits where there is not a great excess of large stone but where there is too much sand.

A screen about 3′ x 6′ is provided with hooks and braces that enable it to be slipped into irons provided on the wagon box. The screen stands at an angle and hangs out over the ground. Gravel is shoveled from the bank and thrown across the wagon on to the screen. It is thus shoveled only once and labor cost greatly reduced. [*Dec., 1917, p. 189.*]

## A House Builder's Business Card

Hugh B. Miller, building contractor, Edgewater Park, N. J., has a business card with the lettering in black right over a brown tinted illustration of a large residence. There is something about this card which might in some respects be copied by a good many contractors. In this the name of the man and his line of business are closely identified on the card with the kind of work he does. It is suggested that the illustration used be selected with a great deal of care in order to get one that will have the right effect when printed in light tone. It need not be in brown—it might be in grey. [*May, 1917, p. 195.*]

## Keeping a Labor Supply

E. H. Backemeyer, of Sioux City Concrete Pipe Co., Sioux City, Ia., in reference to the present labor situation, says that he keeps from six to ten men in his plant at a wage which keeps them pretty well satisfied with a steady job, and he keeps a liner advertisement running in the daily paper in his city all the time for laborers. This is because of the shifting tendency of labor in the last year or so. In this way he is able to use the green men and get along very well at market price for common labor. He says it doesn't take a high priced man to tip over a concrete pipe that is well cured and roll it out into the yard. [Mar., 1918, p. 83.]

## Acid-Proofing Concrete

Substances proving efficacious in protecting concrete from the action of acids of varying strength are recommended by K. E. Hildreth, Syracuse, N. Y., as follows:

*Pitch*—This well known coal tar derivative serves well in protecting a basin or channel where the acid or acid solution is at rest or under flow. A sixty point or sixty sulphur pitch has been found to adhere firmly and remain hard under ordinary range of temperatures. The enamel surface particularly resists the scouring action of stream flow. Acidities ranging in degree up to 10% do not attack it. In all probability it will resist much stronger solutions. Its application is necessarily limited to surfaces that are perfectly dry and where space is not so confined as to render the fumes, arising when it is brushed on hot, dangerous to workmen.

*Gilsonite, or Uintaite*—An asphalt or mixture of hydrocarbons which is in the form of a black, brittle and lustrous mass readily workable when heated as is the pitch. Should be thinned, using benzol to apply as a bond coat, then the enamel coat applied hot. (This asphalt is found in Colorado and Utah. A chemical investigation of gilsonite is reported in the Jour. Franklin Inst., Vol. 140, 1895, p. 221, by W. C. Day)

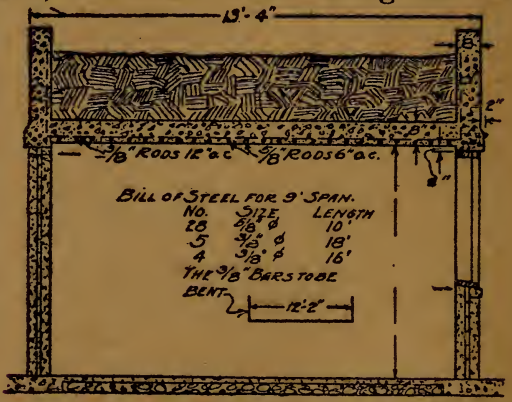
*Minubrite Mastic*—This is a commercial product, a blended asphalt. A bond coat is first brushed on and then the mastic

is troweled on to a thickness varying with the service, from ¼" in channels carrying solutions having swift flow to 1/16" in basins or tanks where the liquid is quiescent. Advantages of this material are that it is applied cold, the surfaces need not be absolutely dry and the matter remains plastic, so that expansion does not check the surface. If trouble should be experienced in swift flow channels or at bends this plasticity allows of the surface being sanded; use sharp silica sand, to offer a wearing surface resisting the abrasive stream action. This has been found to resist the action of hot concentrated nitric acid for a period of several months without being affected. Installation was temporary. Weak acids do not seem to affect it when contact is indefinite.

[*June, 1918, p. 205.*]

## Using Space Under Barn Driveway

It is suggested by the University of Wisconsin that in many cases the space under the elevated drive or bridge to the barn floor could be profitably used for a milk room, the drive itself being the roof.




Suggested Details for Room Under the Barn Driveway

Obviously, there are many uses to which this space can be adapted profitably, one of which can well be root storage, since only the two side walls are ordinarily exposed, and since they can easily be banked with earth if desired for further protection.

Provision could be made for filling such a root cellar from above, through a trap door, simply by driving the load up the regular barn driveway. [*Apr. 1918, p. 140.*]

# Window Details

Here are some window details used on concrete walled houses at Claymont, Del., for the General Chemical Co. They were worked out by Milton Dana Morrill. All frames were built up on the job. In Fig. 1 is shown a vertical section through the window head. A strip of tin is tacked to the yoke and extends up into the concrete. This makes a joint that is air tight as well as watertight.

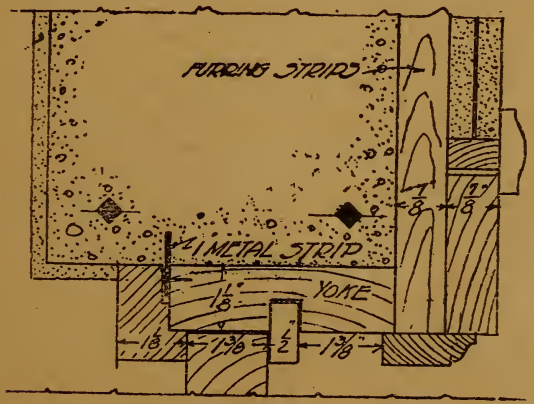



FIG. 1—WINDOW DETAILS

A plan cut through the side of the window frame is also shown. The sash weight box is formed by tacking a channel shaped metal strip to the pulley stile. The sill and the yoke are cut long, so that this metal weight box has a secure nailing top and bottom. On account of the channel shape of this metal weight box, it makes a very rigid frame and is at the same time lighter and less expensive than the usual wood frame. (See Fig. 2.)

The frames were made up with a reveal strip tacked on in place of the staff, as shown in the detail. These temporary reveal strips built the frames out to the thickness of the walls, so that the frames

complete were set in the steel forms at any point desired, and the concrete poured around these frames, making a weather tight joint. By the use of this simple metal weight box the wood work, which is sure to shrink, is reduced to a minimum when the concrete is poured around the windows. The temporary reveal strips are removed and the

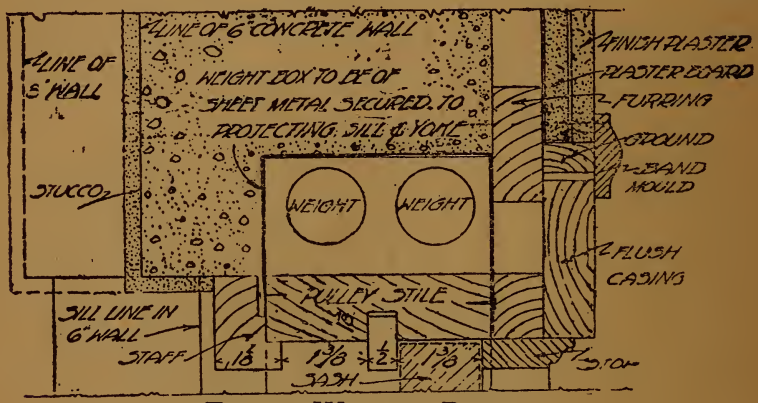



FIG. 2—WINDOW DETAILS

staff strip is applied. This serves both as a finish and forms the sash runway. The stucco was finished up against the staff. The reveal strips were made of 1¼" cypress, so that they were used over and over again.

A sill detail is shown, with a drip under the sash. The temporary reveal strips extend down below the wood sill and form a recess. The finished concrete sill is afterwards molded in place. Wires are left projecting in the sill recess, which furnish a secure bond (Fig. 3).

The outside wood sill is applied after the concrete sill is finished and is so arranged as to extend down and cover the joint between the main wood sill and the concrete. This outside wood sill is set with a white lead joint. While time is the best test of new structural details, such, for instance, as

this window sill, it seems quite possible that it will eliminate one of the difficulties in concrete house building—the making of watertight window sills. The brick in the usual wall are so porous that they absorb any water that beats in under the sill, but

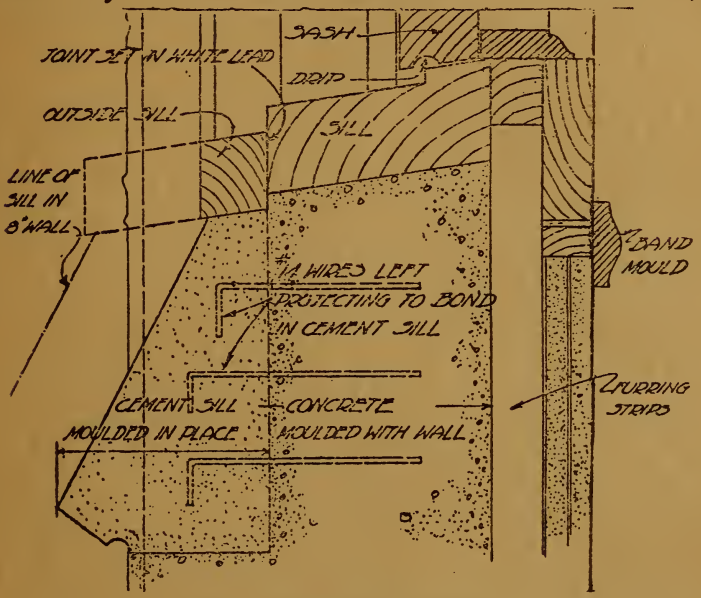



Fig. 3—Window Details

the concrete does not take the water so freely and this accounts, perhaps, for the fact that windows in some of our concrete houses have given trouble from leaks. As a rule the frames are much more nearly weatherproof in a concrete wall than in a brick wall. (Jan., 1919, *p. 19.*]

## Underpinning in Soft Soil

"You can't build on that, why you will not strike solid ground for another 10′," they told me. "That is all that black 'muck'." Here is what I did: I got a well digger, who had nothing to do for that week, to drill holes for my footings for the walls, garbage incinerator and porch and post footings. We dug 33

holes from 14′ to 24′ deep, or until we struck solid ground. The result was a fine house on worthless ground.—George Krueger, Milwaukee, Wis. [*June, 1918, p. 207.*]

## Simple Field Test for Organic Material in Sand

To make a field test for organic impurity in sand fill a 12-oz. graduated prescription bottle to the 4½-oz. mark with sand to be tested. Add a 3% solution of sodium hydroxide until the volume of the sand and solution, after shaking, amounts to 7 oz. Shake thoroughly and let stand over night. Observe the color of the clear supernatant liquid.

In approximate field tests it is not necessary to make comparison with color standards. If the clear supernatant liquid is colorless, or has a light yellow color, the sand may be considered satisfactory in so far as organic impurities are concerned. On the other hand, if a dark-colored solution, ranging from dark reds to black, is obtained the sand should be subjected to the usual mortar strength tests.

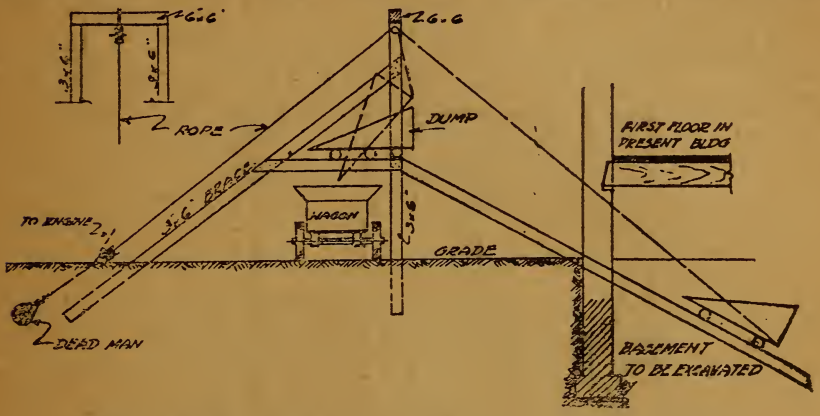
Field tests made in this way are not supposed to give quantitive results, but will be found useful in:

(1) Prospecting for sand supplies;
(2) Checking the quality of sand received on the job;
(3) Preliminary examination of sands in the laboratory.

An approximate volumetic determination of the silt in sand can be made by estimating or measuring the thickness of the fine material which settles on the top of the sand. The percent of silt by volume has been found to vary from 1 to 2 times the percent by weight.—D. A. Abrams, Lewis Institute, Chicago. [*Apr., 1917, p. 151.*]

## Hoisting Kink Used in Excavating

Here is a sketch of a hoist to use in excavating under a building for a basement. The box can be let down on a track into the basement; shovel the




Hoist Employed Economically in Excavation

dirt into the box and pull it out with a horse, and when it gets up over the wagon, it will dump automatically. I find this will cut the labor more than half.—H. C. Wilson, Wilson Concrete Co., Dyersburg, Tenn. [*Sept., 1918, p. 93.*]

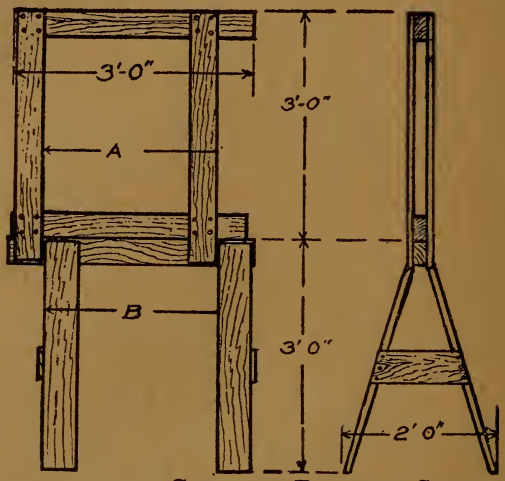
## Hollow Pedestal Over Brick "Form"

In building a pedestal base for a modeled figure for a swimming pool fountain, the design was roughed out in brick, leaving the center hollow, then coated with concrete put on with a trowel on poultry netting drawn over the rough brick form. This made a simple construction, leaving a hollow space for the pipes and connections inside of the pedestal without building forms of special shape and no delays waiting for concrete to set. I think this is very economical for that class of work which would require expensive forms.—J. F. Beckbissinger, Cooper & Beckbissinger, Architects, Saginaw, Mich. [*May, 1918, p. 155.*]

## Handy Scaffold Equipment

The scaffold equipment illustrated is cheaply made and of almost universal use. For laying brick and block, for operating wall machines, for plastering and numerous odd jobs, it is always ready and adaptable.

The horses should be substantially made, with 2 x 4 or 2 x 6 tops and 1 x 6 legs are best for continued




Details of a General Purpose Scaffold

service. The extensions can be made of 2 x 4 or 2 x 3, with 1 x 4 cleats.

The feature of the scaffold is the overhanging end of the horses, which permit placing the extension over them. The scaffold is of course stayed against racking over when in use. [*May, 1918, p. 97.*]

## An Emergency Salamander

In an emergency, make-shift stoves or salamanders may be used. A heavy steel oil drum no longer fit for holding oil proved economical in first cost and in operation. Remove one end and punch a number of 1" holes in the bottom and side near the bottom. The stove should then be set on a loose brick foundation directly under the freshly poured concrete work. A coke fire will burn all night if the drum is filled nearly to the top with fuel.

In one large building where the entire construction was of concrete, dozens of these stoves were used to prevent cracks in the concrete with freezing before it had time to set. [*Dec., 1917, p. 168.*]

## Photographs for Protection

High prices and scarcity of material have undeniably resulted in less carefully graded materials. Unfortunately, visual inspection does not reveal all defects, but where, as in the case of lumber, lax grading is obvious, the practice of a certain lumber dealer is valuable.

As material is unloaded defective pieces are sorted out and arranged by the car so as to show the defects. The lot is photographed and a picture sent with a protest to the shipper.

The same idea can be indefinitely extended by taking photographs of all work where there is any reason to believe question may arise. Pictures are the very best evidence in case of a law suit and have many times prevented suit. Pictures are cheaper than lawyers. [*June, 1917, p. 223.*]

## Keeping Belt-Course Brick in Line

In laying a belt course of brick around a building, especially a soldier course, or where the bricks are standing on their ends, with an inch projection, it is difficult to keep them in line. To do so fasten 1″ boards with a straight edge up against the brick wall by nailing into mortar joints and possibly strips to window frames, these boards to be high enough to allow for a mortar joint under the brick and the brick to rest on the mortar and the edge of the board. This will keep the bottom of the projecting bricks level and the bricks are easily and quickly laid to the line in a perfect manner. The boards are taken away as soon as the course is laid.—Scott Healey, Otsego, Mich. [*June, 1918, p. 205.*]

## Leveling Building With Concrete

W. C. McCreight, of Oklahoma City, Okla., tells just how he uses concrete to straighten up buildings that have settled out of line.

In the case of a frame barn on a stone foundation that had settled, the desired level was first determined and grade stakes driven. The building was then jacked to line by using railroad ties as needles under the sill and the necessary excavation made for the new foundation.

Forms were built to the sill on one side and to a point 4″ below the sill on the other from which pouring was to be done. A "splash board" was fastened to the top of the pouring side so that the forms could be filled through the 4″ space. The forms were built around the needles and sand was packed around them as the concrete was placed to provide for their removal.

While the concrete was still reasonably soft, the forms were removed and the ridge of concrete left next to the sill trimmed off. Variations in this procedure are sometimes made by pre-casting substantial concrete piers and setting them in concrete footing. A hole is left through each pier through which bars can be inserted for handling it. Still another method sometimes used is to jack up the barn and build piers or short sections of walls between the needles, filling in the alternate spaces after they are removed. [Sept., 1918, p. 93.]

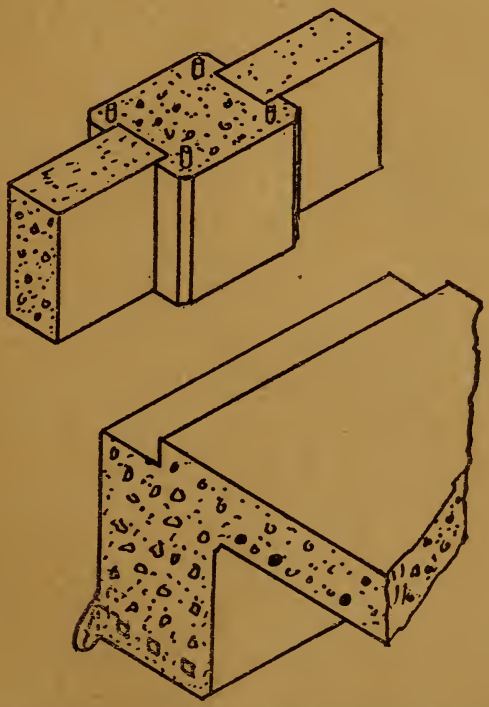
## Preventing Leaks in Concrete Buildings

The details of concrete buildings sometimes do not include provision for keeping water out of construction joints between the concrete frame and the curtain walls.

The illustration shows simple means to accomplish this. A groove the width of a concrete curtain wall,

or slightly wider than tile or brick to be used to allow for clearance, will answer at columns.

The seat for curtain walls should be depressed slightly. The surface of wall beams will prevent leakage at that point while a strip of metal lath bent so as to be molded into the beam can be plastered to form a tight joint at the bottom of the beam.—Philip Tritch, San Diego, Calif.

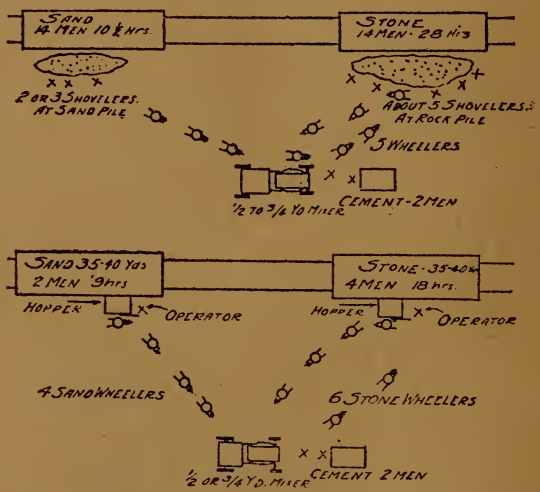


WATERTIGHT JOINTS IN CONCRETE BUILDING

[*Editor's Note:* It is believed that equally good results would be obtained at less cost by setting the curtain wall back and allowing the slightly projecting beam to act as a drip member, unless a curtain wall flush with the outside of the concrete frame is necessary. *Feb., 1917, p. 52.*]

# Spare Tower Hopper Serves as Car Unloader

Where aggregate is used direct from the cars to the mixer, unnecessary handling can be eliminated and the number of men required reduced by hanging to the side of the car a standard steel tower hopper, if one is available. The hopper serves as a reservoir, into which four men can shovel while one man operates the sliding gate at the bottom and charges the wheelbarrows as they come up. A hopper can of course be built of




USE OF STANDARD TOWER HOPPER AS CAR UNLOADER

wood for the same purpose, if the steel hopper is not at hand. The hopper should be hung with hooks in such a way that it can be slid along the side of the car, so as at all times to have the shovelers close to their work.

Comparison between this method of unloading and the old way, where the cars were unloaded to the ground and the material reshoveled into the wheelbarrow, is as follows:

Old Way (1½ or 2:3:5 Mix)

| | Hours |
|---|---|
| Unloading one car rock, 14 men | 28 |
| Sand, 14 men | 10½ |
| Rock, 5 wheelers | 22½ |
| Rock, 5 loaders | 22½ |
| Sand, 3 wheelers | 13½ |
| Sand, 3 loaders | 13½ |
| Total | 110½ |

Requires the use of 16 No. 2 shovels.
Some material wasted.

New Way

| | Hours |
|---|---|
| Rock, 5 wheelers | 22½ |
| 5 men unloading rock | 22½ |
| 3 men wheeling sand | 13½ |
| 3 men unloading sand | 13½ |
| Total | 71 |

Requires the use of 6 No. 2 shovels.
No spoiled material left.

—Glen. H. Thompson. [*Apr., 1918, p. 140.*]

## Using Structural Columns as Ventilating Ducts

In some of the new buildings of the Ford Motor Co. in Detroit the problem of ventilation has been solved in part by arranging ducts inside the structural columns. Naturally the columns are larger than would be necessary if they were solid. They are circular and poured in steel forms. Galvanized pipe the size of the required duct was located concentrically with the forms while intakes of cast iron were attached to the form and the galvanized pipe. This method provides at low cost an efficient provision for ventilation so located as to be in no danger of damage and entirely concealed. [*Feb., 1917, p. 50.*]

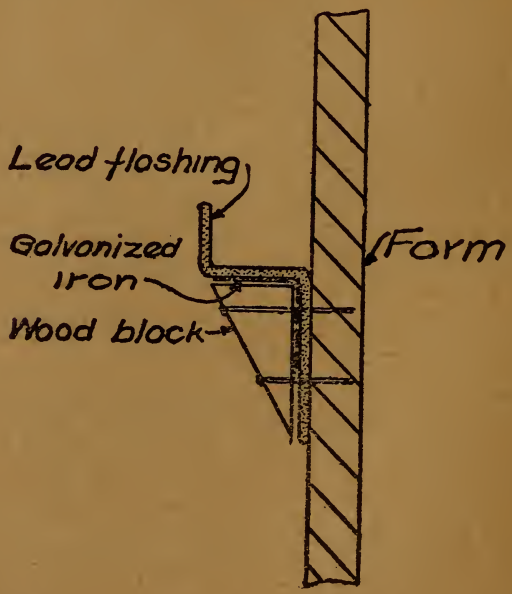
## Mending Rubber Hose

Rubber hose on construction work invariably develops leaks through rough handling. Leaks are a nuisance and often hose is thrown away that with a little trouble could be easily repaired. The usual method of repairing leaks is by wrapping them with

a piece of cloth—usually a cement bag—and the result is never satisfactory. A good and lasting repair job is very easily made. At an electrician's supply store buy a roll of ordinary tar insulating tape and a roll of rubber insulating tape. To mend the leak stop the water and wipe off the outside of the hose. Wrap the rubber tape around the hose over the leak and about 1″ each way, letting the edges of the tape overlap. One thickness is enough. The rubber tape is soft and sticks to the hose. Then wrap rubber tape with tar tape to protect it from wear. [*Feb., 1917, p. 87.*]

## Placing Lead Flashing

Specifications sometimes call for lead flashings. It is usually placed by leaving a raglet and pointing the




A Method of Placing Lead Flashing

flashing in place after the forms are stripped. On account of the softness of the material it cannot be tacked on the forms and the concrete placed, as with

copper flashing. As the best results are obtained by having the flashing in place when the concrete is poured, the following method was devised, which was entirely satisfactory. The lead flashing, bent to proper shape, is supported on a piece of galvanized iron bent in the form of a right angle. This galvanized iron, in turn, is supported by triangular shaped pieces of 1-in. material, nails being driven through the blocks into the form. These blocks are spaced about 20″ to 24″ apart and either can be removed when the forms are stripped and the cavity left by them pointed, or they can be left in place and the base flashing nailed to them.

Copper or galvanized iron flashing, on account of its greater stiffness, can be supported directly on the triangular blocks.—Samuel Warren, N. Y. C. [*Feb., 1917, p. 51.*]

## Removing Ink Stains from Stucco and Concrete

As to removing ink stains from concrete or stucco, I cannot advise definitely, as much depends on the nature of the ink, the depth of the penetration, etc. In general, however, we find that a strong solution of caustic soda applied in successive treatments will eventually remove most ink stains entirely. This cannot injure the concrete and should be tried by all means. Oxalic acid is also effective in many cases. A 10% solution should be used, the concrete being allowed to dry out between applications. My own experience with this is that it is less effective than the caustic soda. It might be possible to cover the spots with a paint made with white cement and finely ground marble, but this should not be resorted to until all efforts to remove the stains themselves have failed. —William B. Newberry, Sandusky Cement Co., Cleveland.

Our recommendation would be to wash the surface with hot water and a scrub brush, taking off nearly all of the ink. Then to have the same mechanic who did the original work do the front over again, stopping on the corners and not lapping around onto the sides, would make a fresh, clean looking front, but would not show mussy joints. After washing, paint the surface of the complete house with a specially prepared cement wash, tinted if desired, that mixed with water and applied with a brush, or through a spray pump, becomes part of the wall.

Regarding stains on a floor, that is a much more difficult matter to cure. If it is an ordinary concrete floor, we would scrub it. Then we would take a carborundum brick No. 150 grain and some pulverized sand and with plenty of water carefully grind the floor down.

If the floor is pitted during this grinding, we would fill the pits with a bonding cement (extra finely ground portland cement—Editor), troweling the bonding cement onto a well soaked surface late in the afternoon, using just enough material to fill the pits. The next morning early spread a coat of damp sand over the floor and keep sand wet 3 or 4 days. If this is done all over the porch floor, it should correct the trouble.—S. W. Curtis. [*Aug., 1917, p. 52.*]

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Where a stucco finish or concrete floor has been stained with ink, I would suggest the following treatment, which will obliterate all traces of ink. In 2 qts. of water dissolve ½ lb. of chloride of lime. Let the solution stand 24 hours and strain through several thicknesses of clean cloth. Add 8 drams of 26% acetic acid. Apply this mixture to the stained spots with a piece of cloth wadded on the end of a stick, and remove the surplus by dousing with water.

This treatment will remove all the ink it can get to, except document safety inks containing carbon, or

inks containing prussian blue. I do not know what effect the mixture will have on the concrete or stucco, but do not imagine it will injure it. If the stucco is perfectly white, it may leave a yellowish spot, but if care is taken in making the mixture the stain left by it should be slight and easy to cover so as not to be noticeable.—Alfred J. Miller. [*Oct., 1917, p. 123.*]

## Caisson Excavation Costs Reduced

In the construction of a central heating plant in Detroit, a large number of caissons were sunk 60′ deep, through heavy clay. Holes were 4′ 6″ in dia. spaced about from 9′ to 16′ each way.

In handling this work, T. Murphy, superintendent for the contractor, A. A. Albrecht Co., adopted a novel method. A number of timber platforms were built at such a height that the material could be dumped from them directly into wagons and these were set up over the holes and a tripod erected carrying a block over which the hoisting ropes ran. The ropes were led back to the ground through a snatch block and then to the niggerhead of a hoist. As many as four ropes were laid to each hoist and could be handled alternately by a hoist operator. One Novo hoist operated by a gasoline engine and two electric hoists were used. Two men in each hole filled the bucket and placed the lagging which consisted of 4′ sections, tongue and groove 2′ x 6″, of planks held in place by spreader rings.

To handle the soil, wagons were driven alongside the platforms and loaded, enough extra wagons being used to keep the teams employed steadily.

There was, therefore, no time lost for teams. Costs were cut $2.00 per cu. yd. from former costs on similar work. [*July, 1917, p. 17.*]

## New Ideas in Manhole Construction

Two clever wrinkles in the construction of duct lines and manholes for underground electrical work are utilized by the Public Service Co. of N. J. in street work now being done.

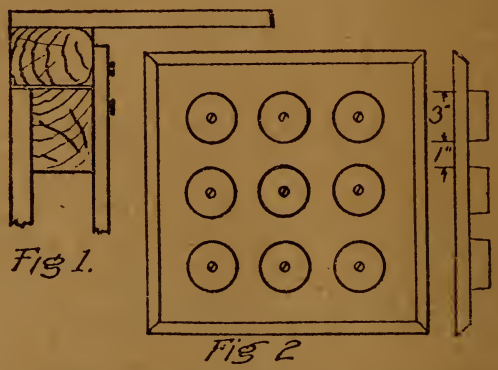



FIG. 1—CORNER DETAIL OF MANHOLE FORMS
FIG. 2—SKETCH OF INSERT FORM FOR DUCT PLACING

A typical conduit line is being laid in Nassau St., Princeton, consisting of nine J. M. ducts, 3″ and 3½″ in diam., the latter for the high tension lines. The ducts are laid in concrete, in three tiers of three ducts each. Concrete manholes are constructed at intervals, mostly 5′ x 7′. N. C. pine ship-lap boards are used for form sides. These are nailed to 3″ x 4″ joists, the boards constituting the long sides being secured to the 3″ edge of the timbers, and those making up the short sides of the manhole, to the 4″ sides of the joists (Fig. 1). The outer edge of the joists carrying the long sides are flush with the back of the end forms, the 1″ difference between the 3″ and the 4″ dimension being made up by a cleated strip, with which the corner joists are fastened together. Two upright braces are used on the long sides and one on the short side, in both cases without nailing, and two cross-braces are used, one near the top and the other near the bottom.

When removing the form, the cross-braces are removed and the ends taken out first, after the cleats attaching them to the side forms have been removed. By this means it is possible to use the same lumber five or six times.

The other feature is the use of round wooden buttons to indicate the proper location of the ends of the ducts which enter the manhole. These are 1″ long and of the same diameter as that of the ducts used. The buttons are screwed to an auxiliary form of required size constructed of 2″ spruce planks, the whole form being beveled at all edges. Buttons are spaced so that the proper interval of 1″, for concrete filling, shall intervene between ducts when laid, and in proper alignment so that the ducts shall enter the manhole in proper lines and tiers.

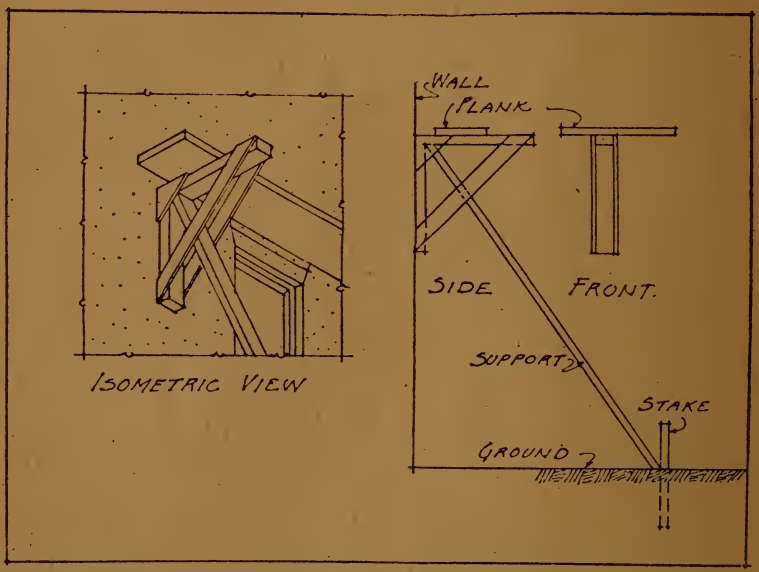
It is found that the use of the buttons, which are very inexpensive, obviates the difficulty of getting the ducts in proper line and with the requisite spacing, which is inevitable when the old method of aiming the ducts at lines drawn on the form is relied upon. These ideas were original with J. E. Armstrong, Field Engr., for the Public Service Co.—W. B. Conant, Concord, Mass. [*Feb., 1917, p. 52.*]

## Monthly Postcard Photos for Advertising Purposes

Bent Bros., contractors, Los Angeles, use postcard photographs of their work—usually progress pictures —with a few lines of description, to advertise their work. On the address side of the card in a space reserved for correspondence, Bent Bros. list their large contracts in progress. On the side with the illustration the card calls attention to one of the big contracts. Every month Bent Bros. send out a new post card photograph to keep their work constantly before prospective clients.

## A Handy Scaffold Bracket

The accompanying sketch shows a handy light scaffold. It is just a loose bracket staked in at the bottom and leaned against the building. By tacking




HANDY SCAFFOLD BRACKET

the runway to the bracket, swaying is prevented. It was used successfully on group concrete house construction at Claymont, Del., for the General Chemical Co.

## Crushed Firebrick as a Concrete Aggregate for Special Uses

In response to an inquiry as to the use of crushed fire brick as a concrete aggregate, L. C. Wason, President Aberthaw Construction Co., Boston, says that this was used with success at the State Farm, Bridgewater, Mass., for building an oven in which to bake bread. The temperatures maintained in this oven are quite high, and directly over the fire pot the concrete becomes red hot. This concrete of crushed fire brick

has stood the racket perfectly for three or four years. Mr. Wason suggested to the Underwriters' Laboratory at Chicago, in connection with a fireproof material test on columns, that one or more specimens be built of fire brick concrete. This was not acted upon, probably on the grounds that there was no fire brick aggregate for any such use, and it would, therefore, be a waste of time. If an unlimited supply could be developed, tests undoubtedly would be made and might result in the solution of special problems where concrete is to be subjected to intense heat, although firebrick could scarcely be considered in general practice, because of the limited supply. [*July, 1916, p. 19.*]

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